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OCEANOGRAPHIC OBSERVATIONS AT OCEAN STATION P (50°N, 145°W)

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May 12 - September 20, 1972

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Water Management Service
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MARINE SCIENCES DIRECTORATE, PACIFIC REGION

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By

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Victoria, B.C.
Marine Sciences Directorate, Pacific Region
Environment Canada
December, 1972

INTRODUCTION

Canadian operation of Ocean Weather Station P (latitude 50°00'N, longitude 145°00'W) was inaugurated in December, 1950. The station is manned by two vessels operated by the Marine Services Branch of the Ministry of Transport. They are the CCGS VANCOUVER AND THE CCGS QUADRA. Each ship remains on station for a period of six weeks, and is then relieved by the alternative ship, thus maintaining a continuous watch. The chief purpose of the station is to operate as a meteorological station for surface and upper-air observations and as an air-sea rescue station.

Bathythermograph observations have been made at Station P since July, 1952. A programme of more extensive oceanographic observations was commenced in August, 1956. This was further extended in April, 1959, by the addition of a series of oceanographic stations along the route to and from Station P and Swiftsure Bank. These stations are known as Line P stations. The number of stations on Line P has been increased twice and now consists of twelve stations (Fig. 1). Bathythermograph observations and surface salinity sample collections in addition to being made on Line P oceanographic stations are also made at odd meridians at 40' i.e. 139°40'W, 141°40'W, etc. These stations are known as Line P BT stations. Data observed prior to 1968 has been indexed by Collins et al, (1969).

The present record includes hydrographic and salinity-temperature-pressure data collected from the VANCOUVER during the period May 12 to June 28, 1972 and from the QUADRA during the period June 23 to August 9, 1972 and from the VANCOUVER during the period August 4 to September 20, 1972.

All physical data have been archived by the Canadian Oceanographic Data Centre (CODC), 615 Booth Street, Ottawa, Ontario, Canada. Requests for these data should be directed to CODC.

Biological and productivity data are published in the Manuscript Report series of the Fisheries Research Board of Canada (FRB), the Biological Station, Nanaimo, B.C., Canada. Requests for these data should be directed to FRB.

Marine Geochemical data are for the Ocean Chemistry Group, Marine Sciences Directorate, Department of the Environment, 512-1230 Government Street, Victoria, B.C., Canada.

Bird observations are sent to Dr. M. Myres, University of Calgary, Calgary, Alberta, Canada; and Marine Mammal observations to Mr. I. McAskie, Fisheries Research Board of Canada, The Biological Station, Nanaimo, B.C., Canada.

Program of Observations from C.C.G.S. VANCOUVER, May 12 to June 28, 1972 (P-72-4) (C.O.D.C. Ref. No. 15-72-004)

Oceanographic observations were made by Messrs. R. Bellegay, C. Jackson and Philip Huggett (Summer Student), Marine Sciences Directorate, Department of the Environment.

En route to Station P Stations 1 to 12 were occupied and STD casts were made to 1500 meters or near bottom. At Stations 4 and 9 profiles were extended to 2400 and 3500 meters respectively with bottle casts. BT casts were made at all Line P Stations plus a special series of XBT casts at all Line P Stations and intermediate stations between Stations 1 to 5 and 9 to 12. XBT casts were made at every 20 minutes of longitude between Stations 5 to 9. Surface salinity and nitrate and nutrient samples were taken at all Line P Stations. The surface temperature recorder was inoperable.

At Station P the oceanographic program was carried out as follows:

I) Physical Oceanography

Profiles of temperature, salinity and oxygen were obtained as follows:

1) Weekly bottle casts to near bottom (4200 meters).
2) Weekly STD casts to 1500 meters before bottle casts (until 5th week on station when instrument was lost overboard).
3) Twice weekly STD casts to 300 meters (until 5th week on station when instrument was lost overboard - these profiles were replaced by bottle casts to 600 meters for balance of patrol).
4) Mechanical BT casts 8 times daily.
5) Surface salinity and oxygen samples from the seawater loop daily at 0000 hrs. GMT.

II) Biological and Productivity

These data were collected as follows:

1) Plankton
Daily vertical plankton hauls from 50 and 150 meters plus a total of two 1200 meter hauls and 9-10 minute horizontal tows. Daily samples from the seawater loop for micro-organisms.
2) Three profiles and three surface samples for plant pigment C-14 productivity and nitrate analysis.
3) Weekly secchi disc depth measurements.
4) High frequency echo sounder was run for three hours in every 24 hour period at a fixed frequency, depth and gain setting.

III) Marine Geochemistry

Data for Marine Geochemical studies were obtained as follows:

1) Oxygen - at standard depths from the bottle stations and from the seawater loop daily at 0000 hours GMT and hourly for two 24 hour sampling periods.
2) Nutrient samples from the seawater loop daily at 0000 hours GMT and hourly for two 24 hour sampling periods.
3) Alkalinity samples from the seawater loop once every three days, hourly for two 24 hour sampling periods and three profiles at 1000 meter interval depths.
4) One seawater C-14 sample.
5) Weekly air CO_2 samples in quadruplicate.

IV) Marine Mammal, Bird and Data Gathered for Other Institutes

1) Marine mammal and bird observations were recorded.
2) Air CO_2 samples for Scripps Institute of Oceanography.
3) Rainwater and surface seawater samples for Scripps Institute of Oceanography.

Enroute from Station P bottle casts were made to 1500 meters or near bottom at Stations 9, 7, 6, 5, 4, 3, 2 and 1, Stations 12, 11, 10 and 8 were missed due to bad weather. BT and/or XBT casts were made at all Line P hydro and BT Stations, surface salinity, nitrate and nutrient samples were taken from the seawater loop at these stations. The surface temperature recorder was run continuously on Line P.

Program of Observations from C.C.G.S. QUADRA, June 23 to August 9, 1972 (P-72-5) (C.O.D.C. Ref. No. 15-72-005).

Oceanographic observations were made by Mr. C. de Jong, Marine Sciences Directorate, Department of the Environment.

En route to Station P Stations 1, 2, 3, 4, 8 and 10 were occupied and STD casts made to near bottom or 1500 meters. Stations 5, 6, 7, 9, 11 and 12 were cancelled due to bad weather. XBT casts were made at all Line P hydro and BT Stations plus a series of extra casts at intermediate points. Surface salinities and nitrate samples were also collected.

At Station P the oceanographic program was carried out as follows:

1) Physical Oceanography

Profiles of temperature, salinity and oxygen were obtained as follows:

1) Weekly bottle casts to near bottom (4200 meters).
2) Weekly STD casts to 1500 meters following bottle casts.
3) Twice weekly STD casts to 300 meters.

4) Mechanical BT casts 8 times daily.
5) Surface salinity sample daily at 0000 hours GMT.

II) Biological and Productivity

These data were collected as follows:

1) Plankton
A total of 29 - 50 meter, 28 - 150 meter and 1 - 1200 meter vertical hauls and 6 - 10 minute horizontal surface tows. Sixteen samples for micro-organisms were taken from the seawater loop.
2) A total of 52 salmon and a great number of pomfret were caught in the fishing program.
3) Three profiles to 200 meters for plant pigment, nitrate and C-14 productivity.
4) Weekly secchi disc depth measurements.

III) Marine Geochemistry

Samples for Marine Geochemical studies were obtained as follows:

1) Oxygen - weekly at standard depths from the hydro casts.
2) Nutrients - daily samples for silicate, nitrate and phosphate plus hourly sampling for one 24 hour period.
3) Alkalinity samples every three days from the seawater loop.
4) Two $C^{14}O_2$ samples from the seawater loop.
5) Weekly air CO_2 samples.

IV) Marine Mammal, Bird and Data Collected for Other Institutes

1) Marine mammal and bird observations were collected.
2) $C^{14}O_2$ samples were collected from 50 meters for Dr. Fairhall, Dept. of Chemistry, University of Washington.
3) Three midwater trawls for biological specimens were made for Dr. Cruchy, National Museum of Natural Sciences, Ottawa, Ontario.

En route from Station P Stations 12, 9 and 8 were occupied and STD casts to 1500 meters were made. The rest of the Line P hydro stations were cancelled due to engine trouble. XBT casts were made at all Line P hydro and BT Stations. Surface salinities and some nitrate sample were taken and the surface temperature recorder was run continuously.

Program of Observations from C.C.G.S. VANCOUVER, August 4 to September 20, 1972 (P-72-6) (C.O.D.C. Ref. No. 15-72-006).

Oceanographic observations were made by Mr. C. Jackson, Marine Sciences Directorate, Department of the Environment.

En route to Station P Stations 3 to 11 were occupied and STD casts to 300 meters at Stations 3, 10 and 11 and to 1500 meters at the others. At Stations 4 and 9 profiles were extended to 2400 and 3250 meters respectively with bottle casts. Stations 1 and 2 were missed due to fog and heavy traffic. Problems were encountered with the STD chart recorder drive causing "jitters". Mechanical or XBT casts were made at all Line P hydro and BT Stations but due to problems with the navigation equipment there was some doubt as to the accuracy of the positions. Surface salinity and nitrate samples were taken at all hydro Stations and the surface temperature recorder was run continuously although it was plagued with frequent sensor malfunctions.

At Station P the oceanographic program was carried out as follows:

I) Physical Oceanography

Profiles of salinity, temperature and oxygen were obtained as follows:

1) Weekly bottle casts to near bottom (4200 meters). Weekly bottle casts to 300 meters as a check against apparent malfunction of STD salinity sensor.
2) Weekly STD casts to 1500 meters following bottle casts.
3) Twice weekly STD casts to 300 meters.
4) Mechanical BT casts 8 times daily.
5) Surface salinity and bucket temperature daily at 0000 hours GMT.
6) Surface temperature recorder ran continously.

II) Biological and Productivity

These data were collected as follows:

1) Plankton
A total of 34 - 150 meter, 2 - 1200 meter vertical plankton hauls, 10 - 10 minute horizontal tows and daily micro-organism samples from the seawater loop.
2) Two profiles and 3 surface samples for pigment, nitrate and C-14 productivity.
3) Weekly secchi disc depth measurements.
4) High frequency echo sounder was run for three hours in every 24 hour period.
5) No salmon and only a few pomfret were caught in the fishing program. However, two boar fish and six skillfish were "brought back alive" for the Vancouver Aquarium.

III) Marine Geochemistry

Samples for Marine Geochemical studies were obtained as follows:

1) Oxygen - weekly at standard depths from the hydro casts and daily from the seawater loop at 0000 GMT.

2) Nutrients - daily samples from the seawater loop plus hourly sampling for one 24 hour period.
3) Alkalinity samples every three days from the seawater loop.
4) Two seawater C-14 samples from the seawater loop.
5) Weekly air CO_2 samples.

IV) Marine Mammal, Bird and Data Gathered For Other Institutes

1) Marine mammal and bird observations were recorded.
2) Rain water and surface seawater was collected for Scripps Institute of Oceanography, La Jolla, California.
3) Phytoplankton samples were collected from the seawater loop at Line P hydro Stations for the University of British Columbia.

En route from Stations P due to bad weather and other reasons only Stations 4 to 1 were occupied and STD casts to 1500 meters or near bottom were made. The profile at Station 4 was extended to 2400 meters with a bottle cast. Mechanical or XBT casts were made at all Line P hydro and BT Stations except from 12 to 9 1/2 when instrument trouble was experienced. Salinity and temperatures were taken at all Line P hydro and BT Stations, nitrates and phytoplankton samples at all Line P hydro Stations.

The surface temperature recorder was run continuously on Line P inbound.

Data was processed by Messrs. R. Bellegay, C. Jackson, C. de Jong, B. Minkley and D. Smith and assembled and edited by Mr. K. Abbott-Smith.

Observational Procedures

Temperatures at depth were measured by deep-sea reversing thermometers of German (Richter and Wiese) or Japanese (Yoshino Keiki Co.) manufacture. Two protected thermometers were used on all Nansen bottles, and one unprotected thermometer was used on each bottle at depths of 300 m or greater. The accuracy of protected reversing thermometers is believed to be $\pm$0.02C.

Surface water temperatures were measured from a bucket sample using a deck thermometer of $\pm$0.1C accuracy.

Salinity determinations were made aboard ship with either an Auto-Lab Model 601 Mark 111 inductive salinometer or a Hytech Model 6220 lab salinometer. Accuracy using duplicate determinations is estimated to be $\pm$0.003 ppt.

Depth determinations were made using the "depth difference" method described in the U.S.N. Hydrographic Office Publication No. 607 (1955). Depth estimates have an approximate accuracy of $\pm$5 m for depths less than 1000 m, and $\pm$0.5% of depth for depths greater than 1000 m.

The dissolved oxygen analyses were done in the shipboard laboratory by a modified Winkler method (Carpenter, 1965).

Line P engine intake continuous temperatures on both ships were recorded by a Honeywell Model 15303836 Recorder. The temperature probe is at a depth of approximately 3 meters below the sea surface and the instrument accuracy is believed to be $\pm$ .1^{o}C.

C.C.G.S. QUADRA is equipped with a Bissett Berman Model 6600-T salinograph-thermograph which is used, on Line P, for continuous recording of surface temperatures and salinities from the ships seawater loop. The temperature probe is mounted at the seawater loop intake (approximately 3 meters below the surface) and the salinity probe and recorder is situated in the dry lab. The accuracy of this instrument is believed to be $\pm$ .1^{o}C for temperature and $\pm$ .1 ppt.for salinity.

Salinity temperature pressure data were obtained with a Bissett-Berman Model 9040 STD on cruise P-72-4 and with a Bissett-Berman Model 9006 STD on cruises P-72-5 and P-72-6.

Computations

All hydrographic data were processed with the aid of an IBM 360 computer. Reversing thermometer temperature corrections, thermometric depth calculations, and accepted depth from the "depth difference" method were computed. Extraneous thermometric depths caused by thermometer malfunctions are automatically edited and replaced. A Calcomp 565 Offline Plotter was used to plot temperature-salinity and temperature-oxygen diagrams, as well as plots of temperature, salinity and dissolved oxygen vs $\log_{10}$ depth. These plots were used to check the data for errors.

Missing hydrographic data were obtained using a weighted parabolas interpolation method (Reiniger and Ross, 1968). These data are indicated with an asterisk in this data record.

Data values that we suspect but are included in this data record are indicated with a plus. These data have been removed from punch card and magnetic tape records.

Analog records from the salinity-temperature-pressure instrument have been hand digitized, then replotted using the Calcomp Plotter.

Digitization was continued until original and computer plotted traces were coincident. Temperature and salinity values were listed at standard pressures; integrals (depths, geopotential anomaly, and potential energy anomaly) were computed from the entire array of digitized data.

The headings from the data listings are explained as follows:

PRESS	is pressure (decibars)
TEMP	is temperature (degrees Celsius)
SAL	is salinity (parts per thousand)
DEPTH	is reported in meters
SIGMA-T	is specific gravity anomaly
SVA	is specific volume anomaly
THETA	is potential temperature (degrees Celsius)
SVA (THETA)	is potential specific volume anomaly
DELTA D	is geopotential anomaly (J/kg)
POT EN	is potential energy in units of 10^8 ergs/cm^2
OXY	is the concentration of dissolved oxygen expressed in milliliters per liter
B-V PERIOD	is the Brunt-Vaisala period in minutes

Please Note: All indicated STD depth data read approximately 1% high.

<u>Summary of Hydrographic Data</u>

The data are graphically summarized as follows:

Composite plots of temperature vs $\log_{10}$ depth (Figs. 4, 5, 6, 7, P-72-4), (Fig. 18, P-72-5) and (Figs. 25, 26, 27, P-72-6).

Composite plots of salinity vs $\log_{10}$ depth (Figs. 8, 9, 10, 11, P-72-4), (Fig. 19, P-72-5) and (Figs. 28, 29, 30, P-72-6).

Composite plots of oxygen vs $\log_{10}$ depth (Figs. 12, 13, P-72-4) (Fig. 20, P-72-5) and (Figs. 31, 32, P-72-6).

REFERENCES

Carpenter, J.H. 1965. The Chesapeake Bay Institute Technique for the Winkler Dissolved Oxygen Method. Limmnol. & Oceaogr., 10: 141-143.

Collins, C.A., R.L. Tripe, D.A. Healey, and J. Joergensen, 1969. The Time Distribution of Serial Oceanographic Data from the Ocean Station P Programme. Fisheries Research Board of Canada, Technical Report No. 106.

Reiniger, R.F. and C.K. Ross, 1968. A Method of Interpolation with Application to Oceanographic Data. Deep Sea Re. 15: 185-193.

U.S.N. Hydrographic Office, 1955. Instruction Manual for Oceanographic Observations, Publication No. 607.

LIST OF FIGURES

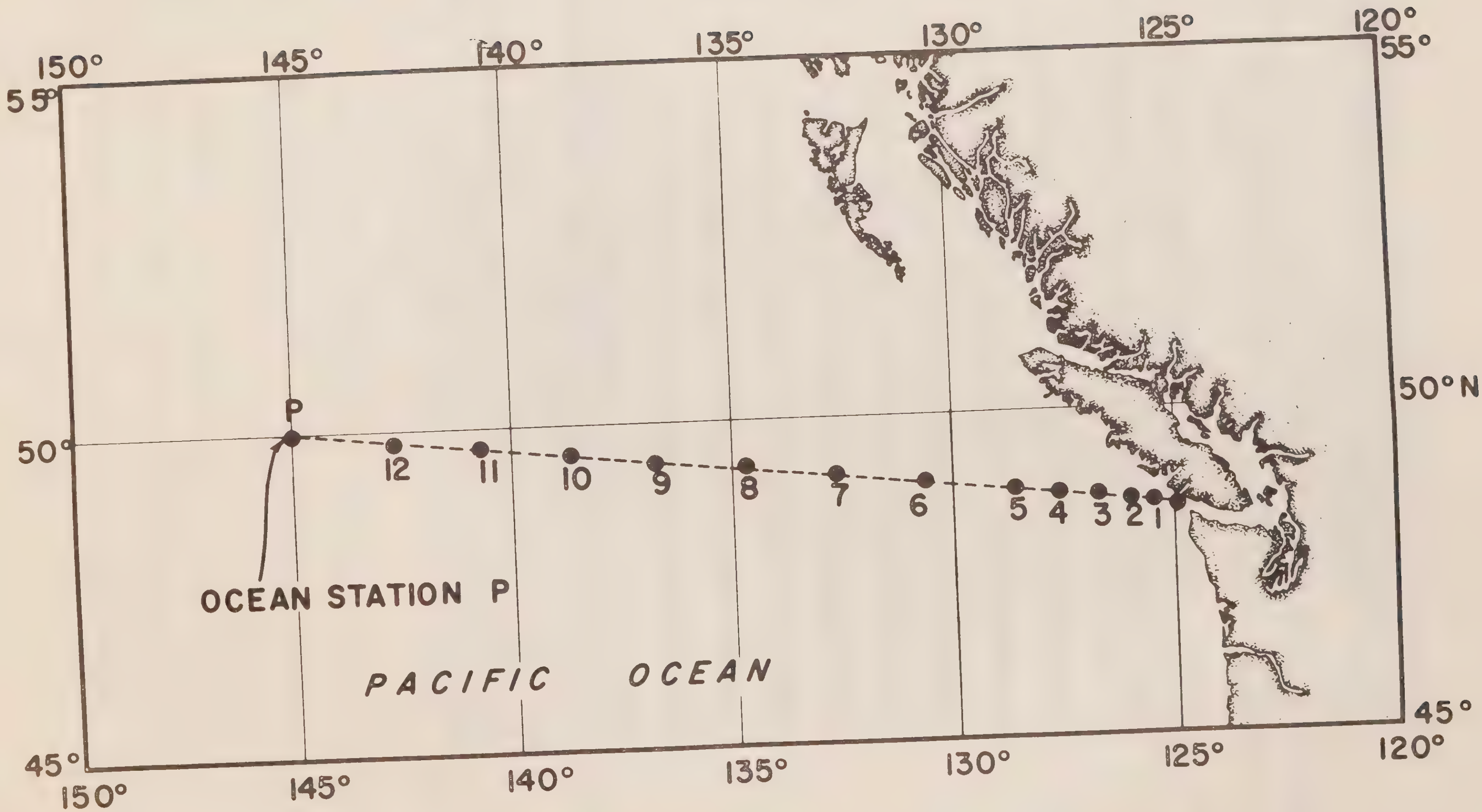


Fig. 1 Chart showing Line P station positions.

OCEANOGRAPHIC DATA OBTAINED ON CRUISE P-72-4

(C.O.D.C. REFERENCE NO. 15-72-004)

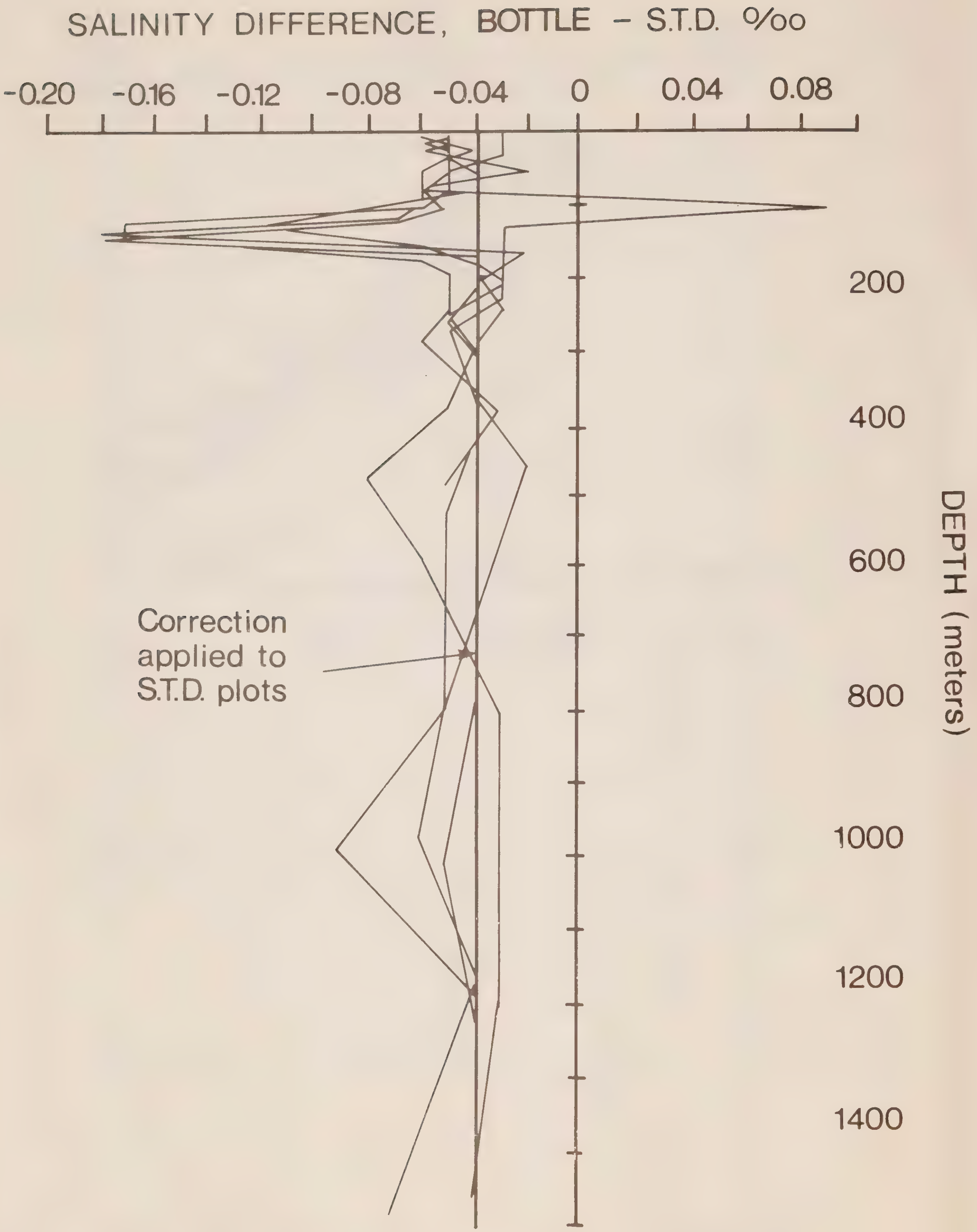


Figure 2 Bottle - STD salinity value difference profiles P-72-4.

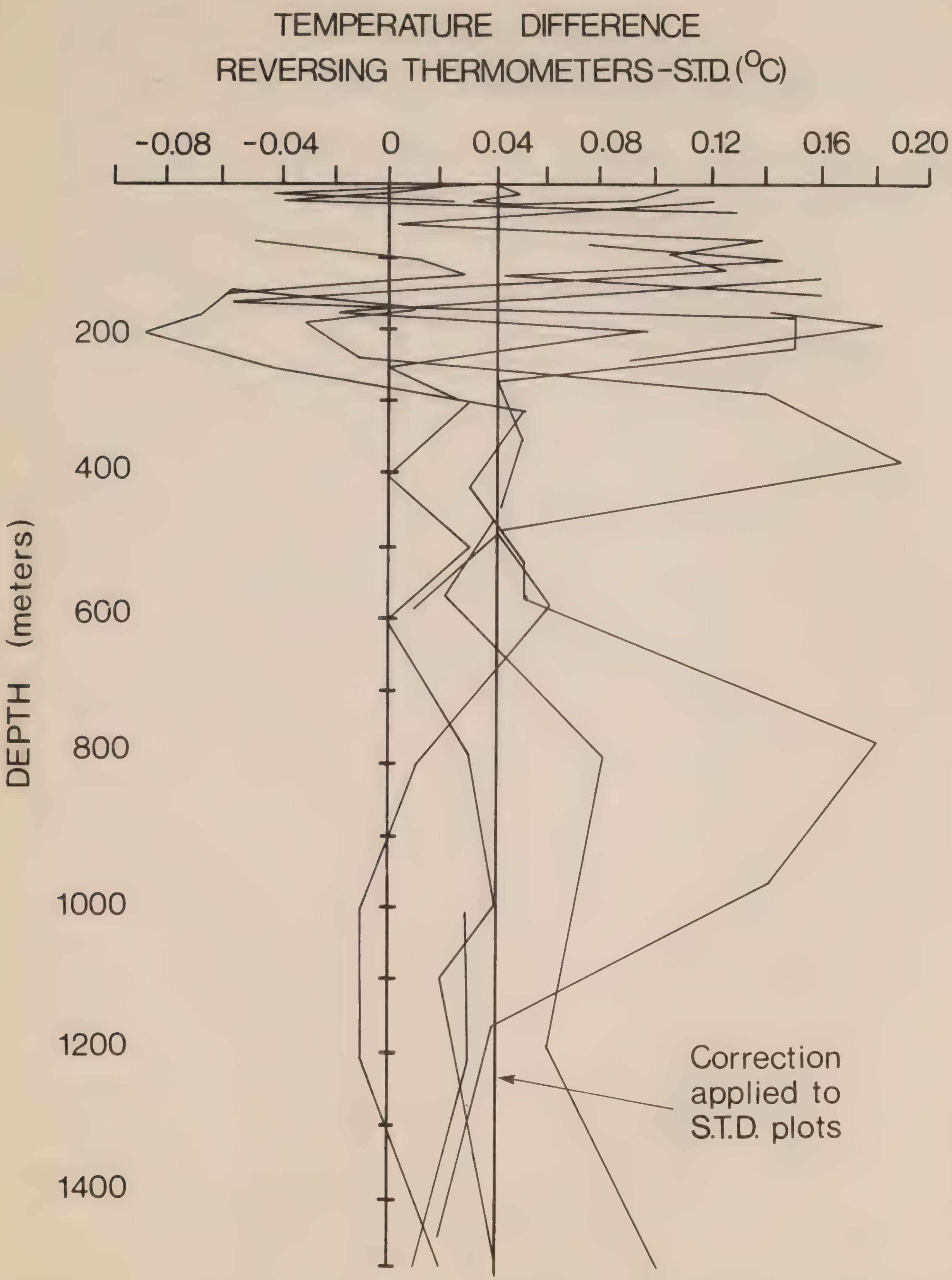


Figure 3 Reversing thermometer - STD temperature difference profiles P-72-4.

COMPOSITE PLOTS OF TEMPERATURE, SALINITY

AND DISSOLVED OXYGEN VS DEPTH

(P-72-4)

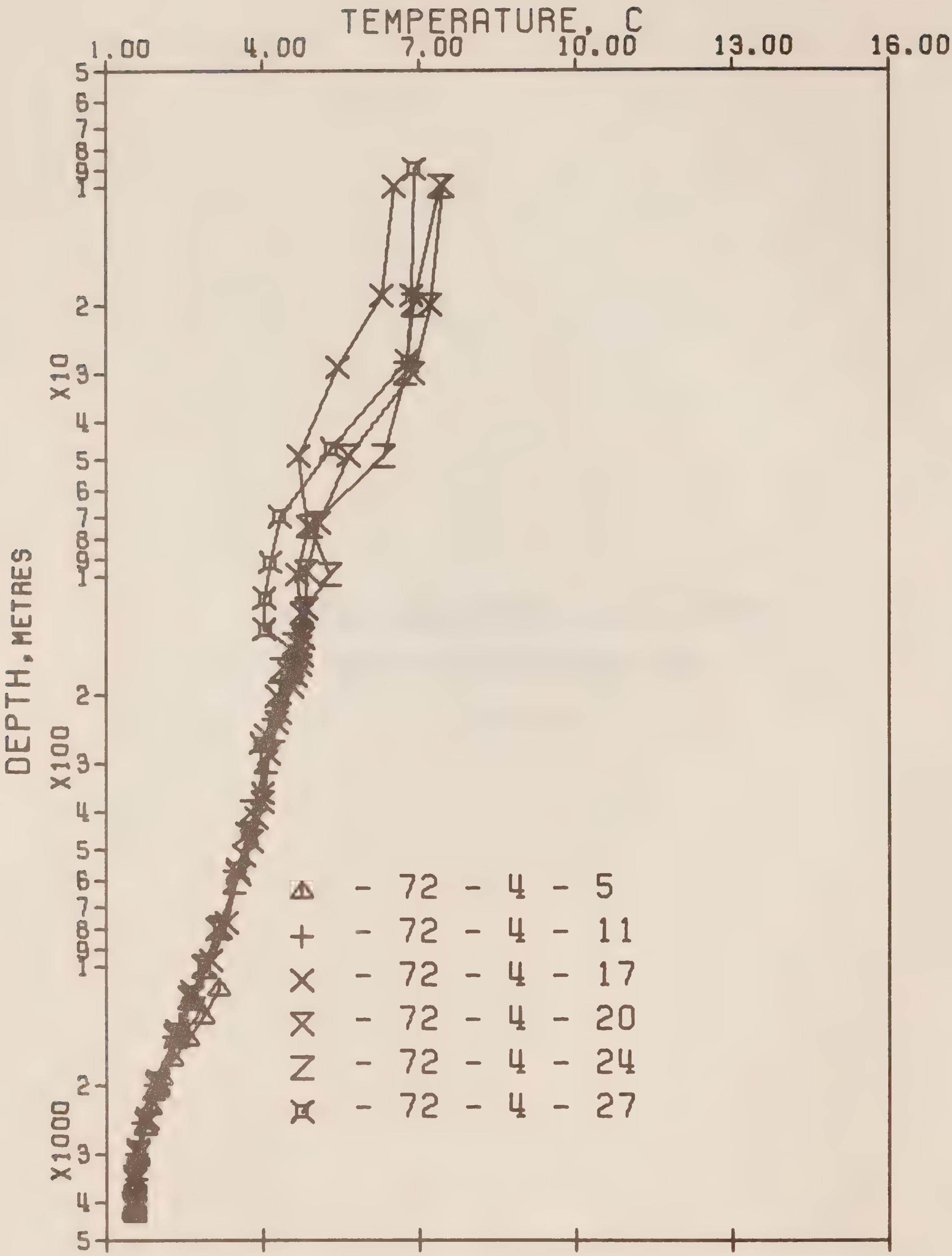


Figure 4 Composite plot of temperature vs $\log_{10}$ depth P-72-4.

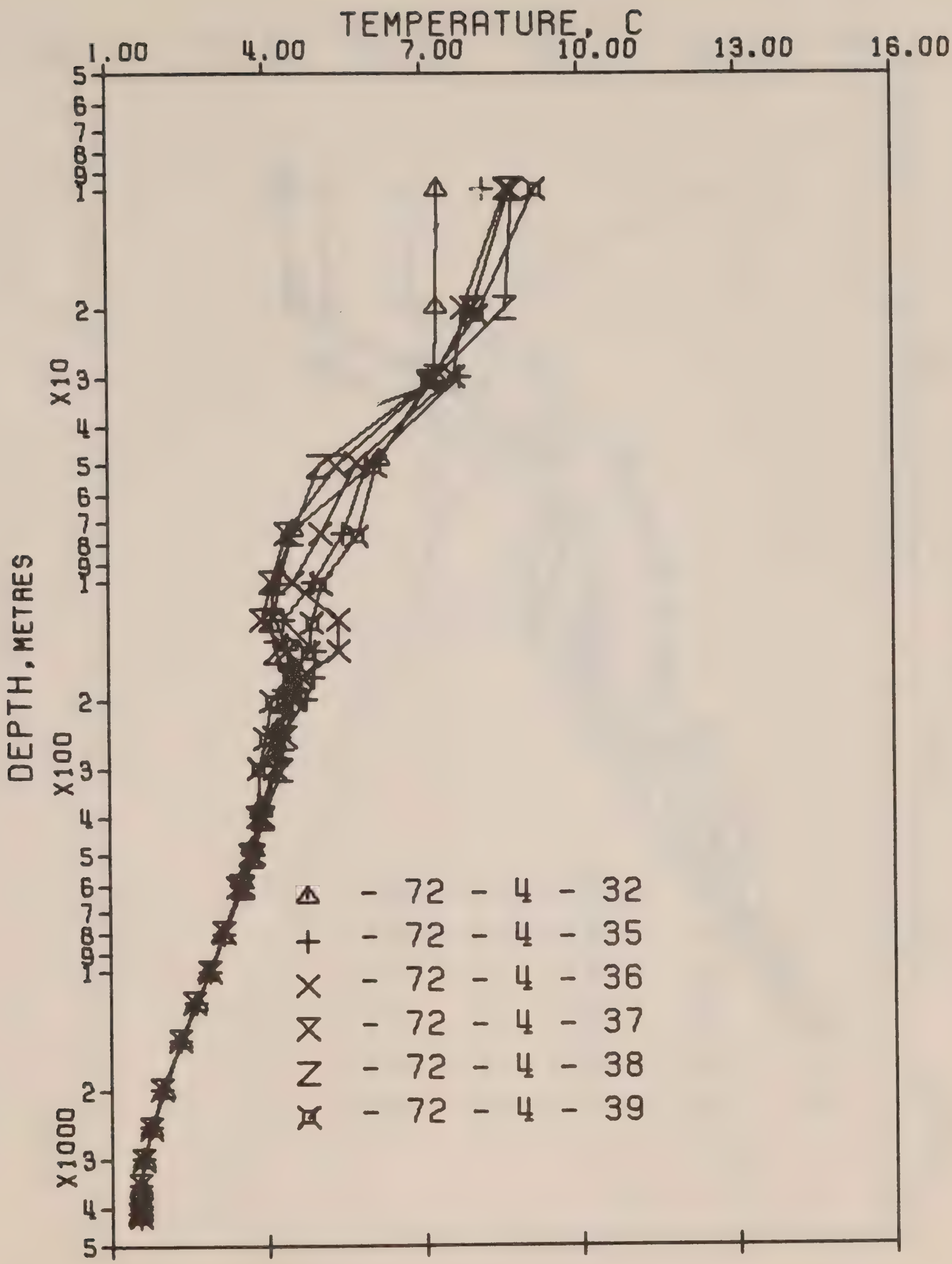


Figure 5 Composite plot of temperature vs $\log_{10}$ depth P-72-4.

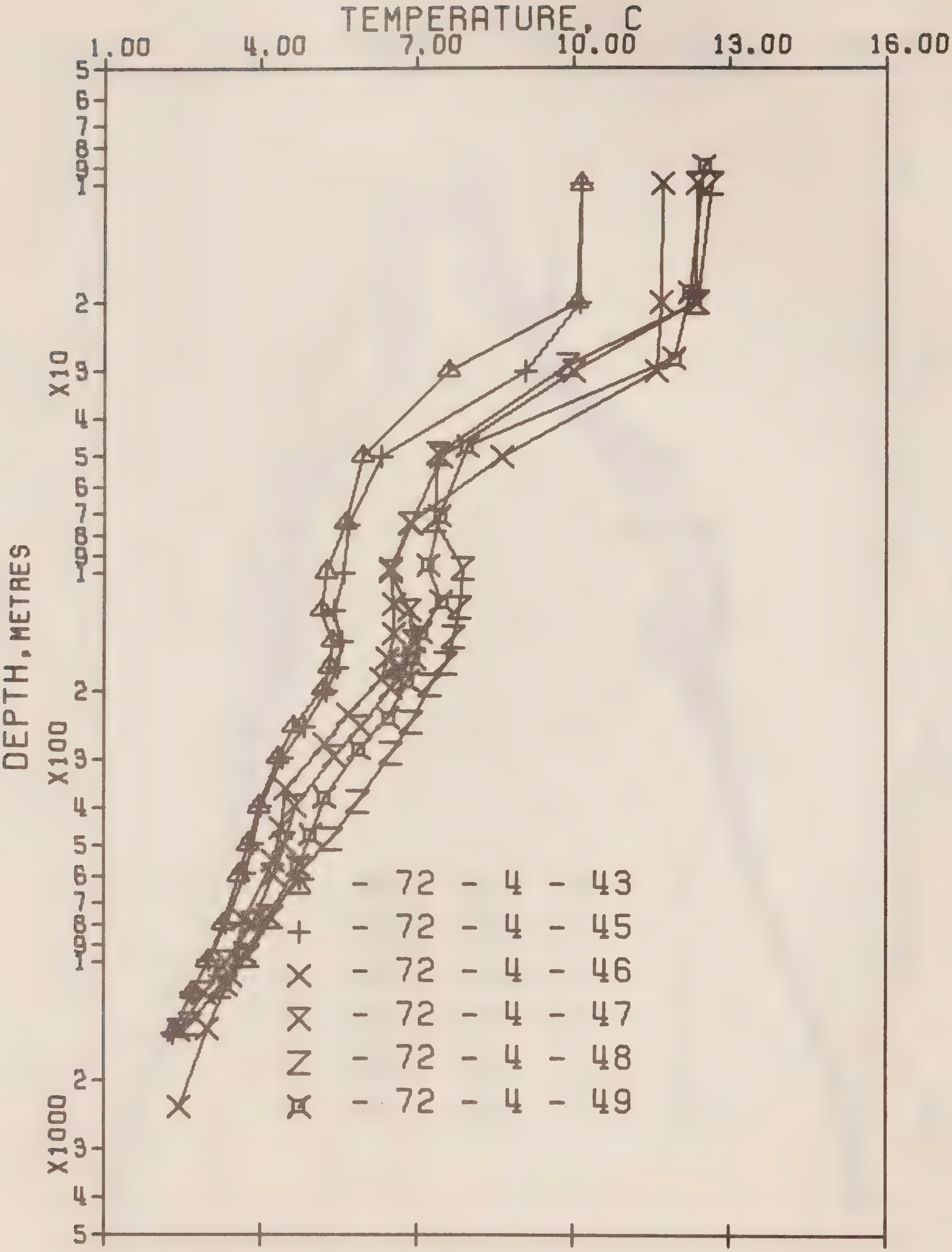


Figure 6 Composite plot of temperature vs $\log_{10}$ depth P-72-4.

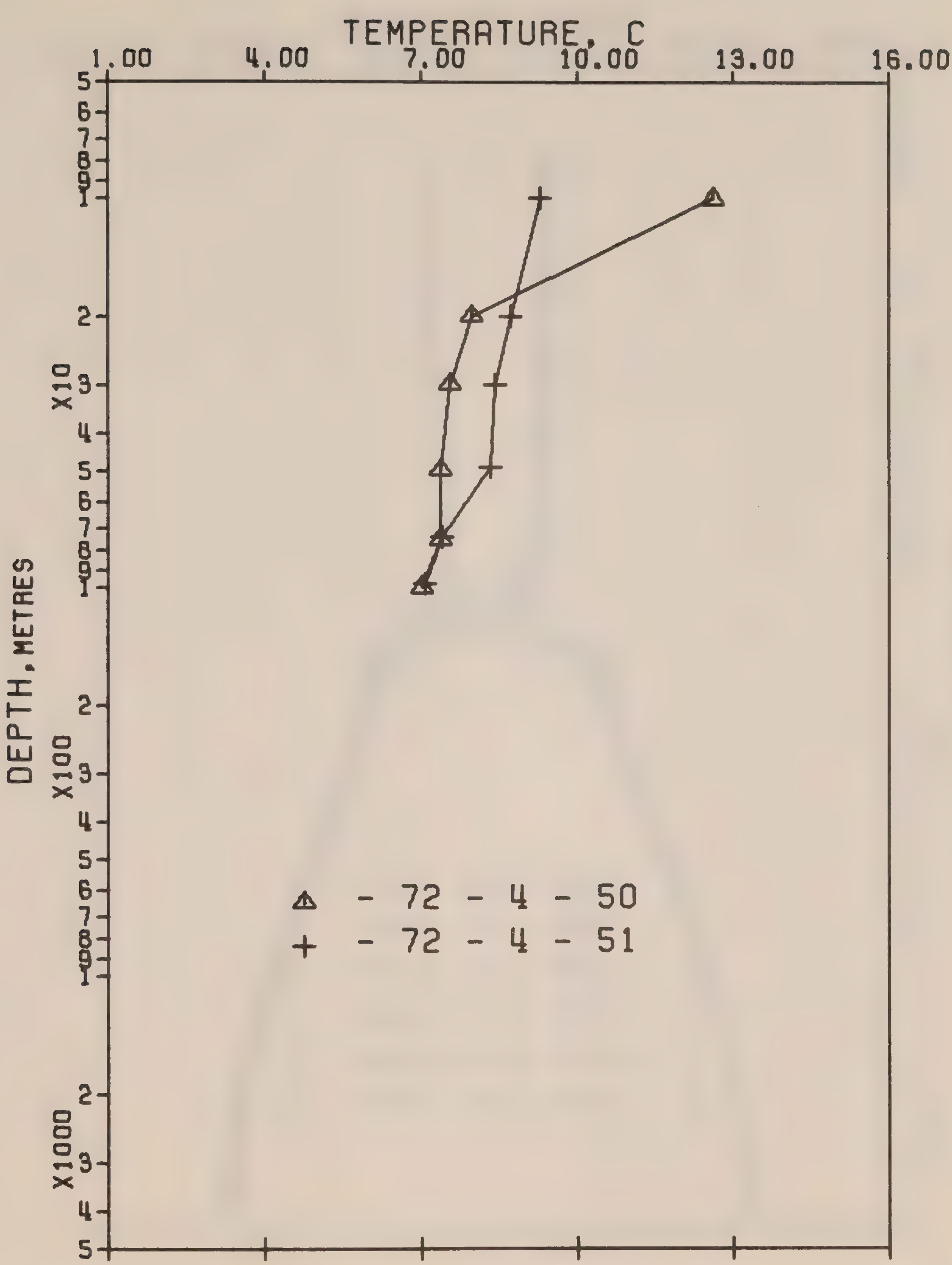


Figure 7 Composite plot of temperature vs $\log_{10}$ depth P-72-4.

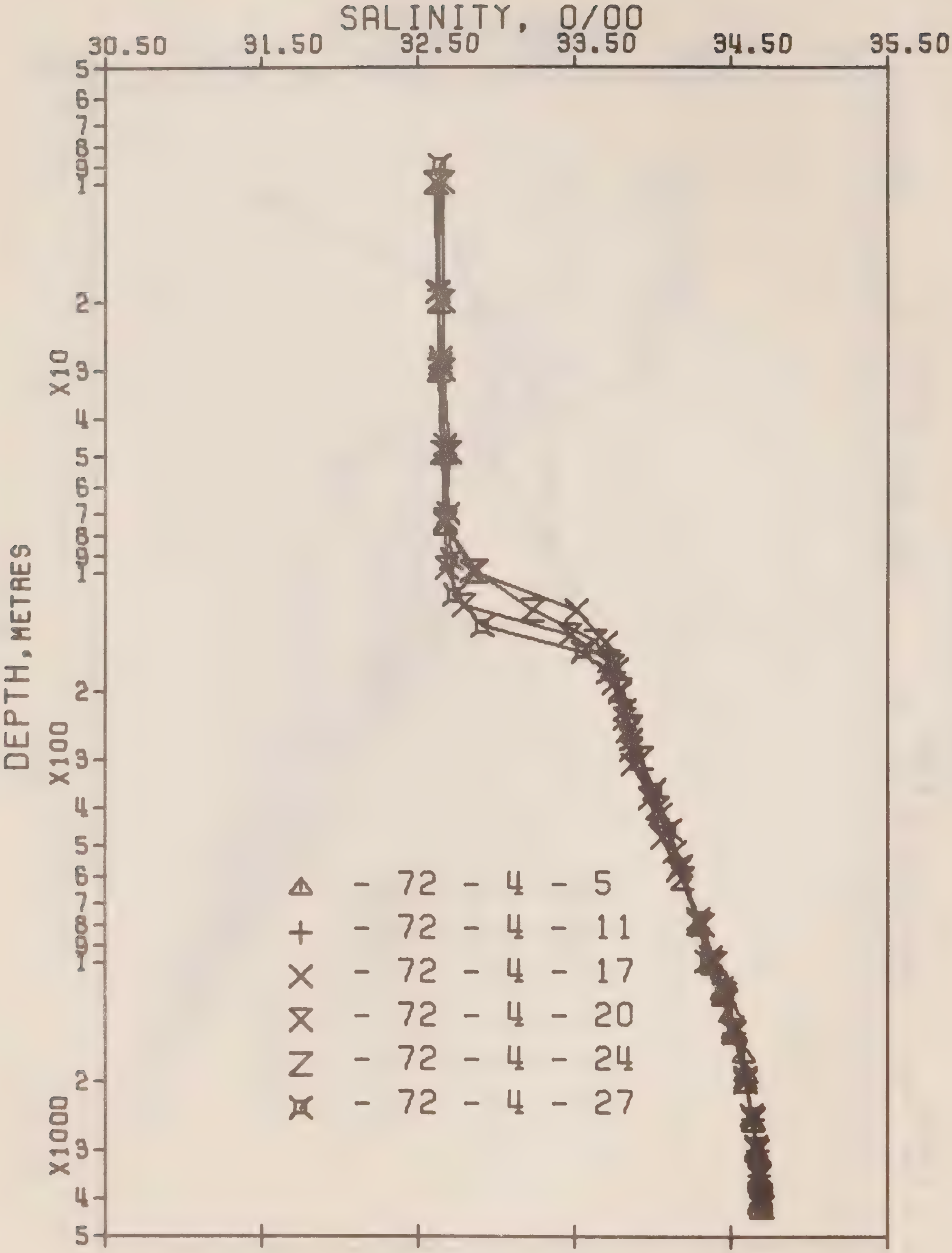


Figure 8 Composite plot of salinity vs $\log_{10}$ depth P-72-4

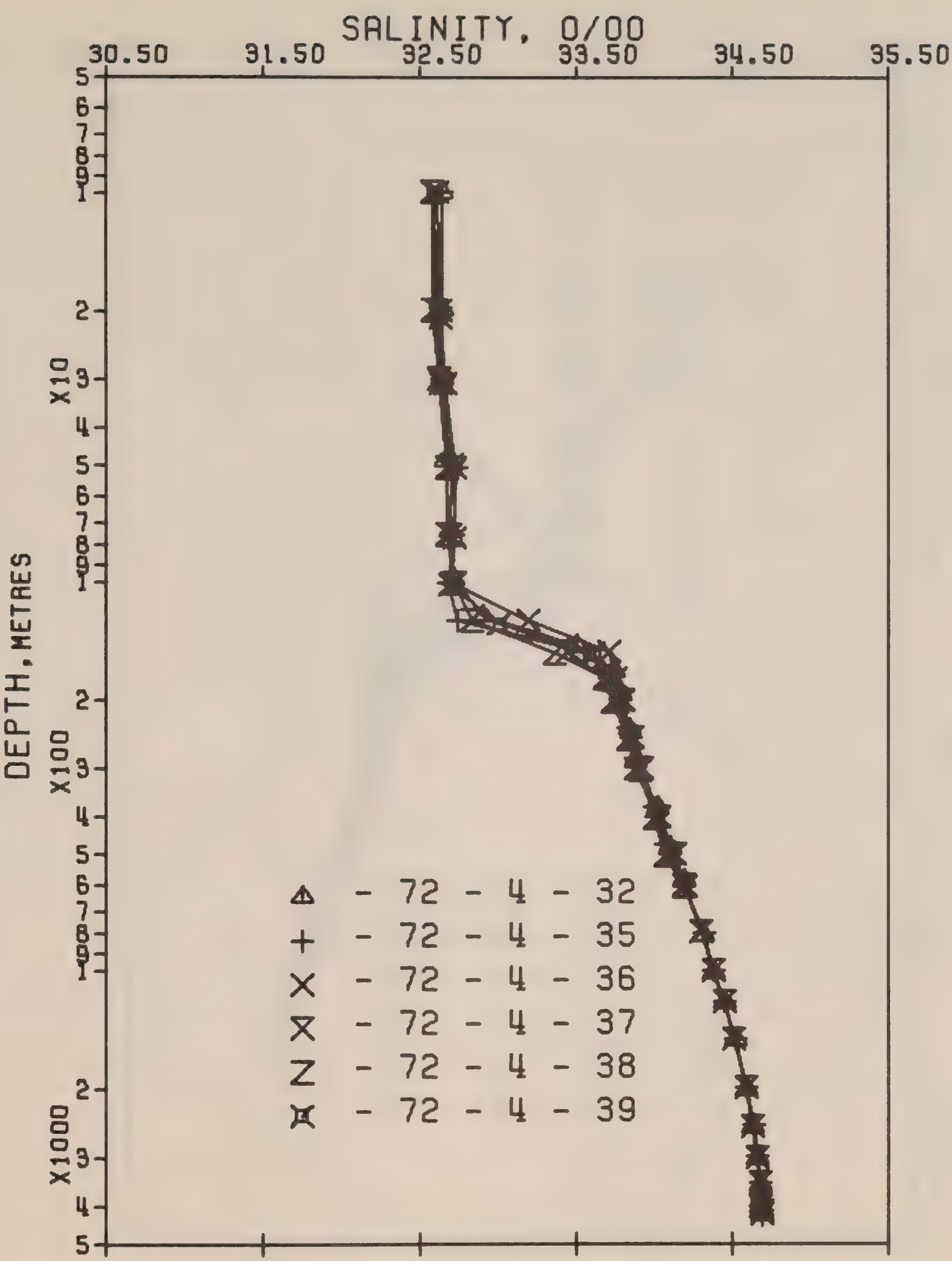


Figure 9 Composite plot of salinity vs $\log_{10}$ depth P-72-4.

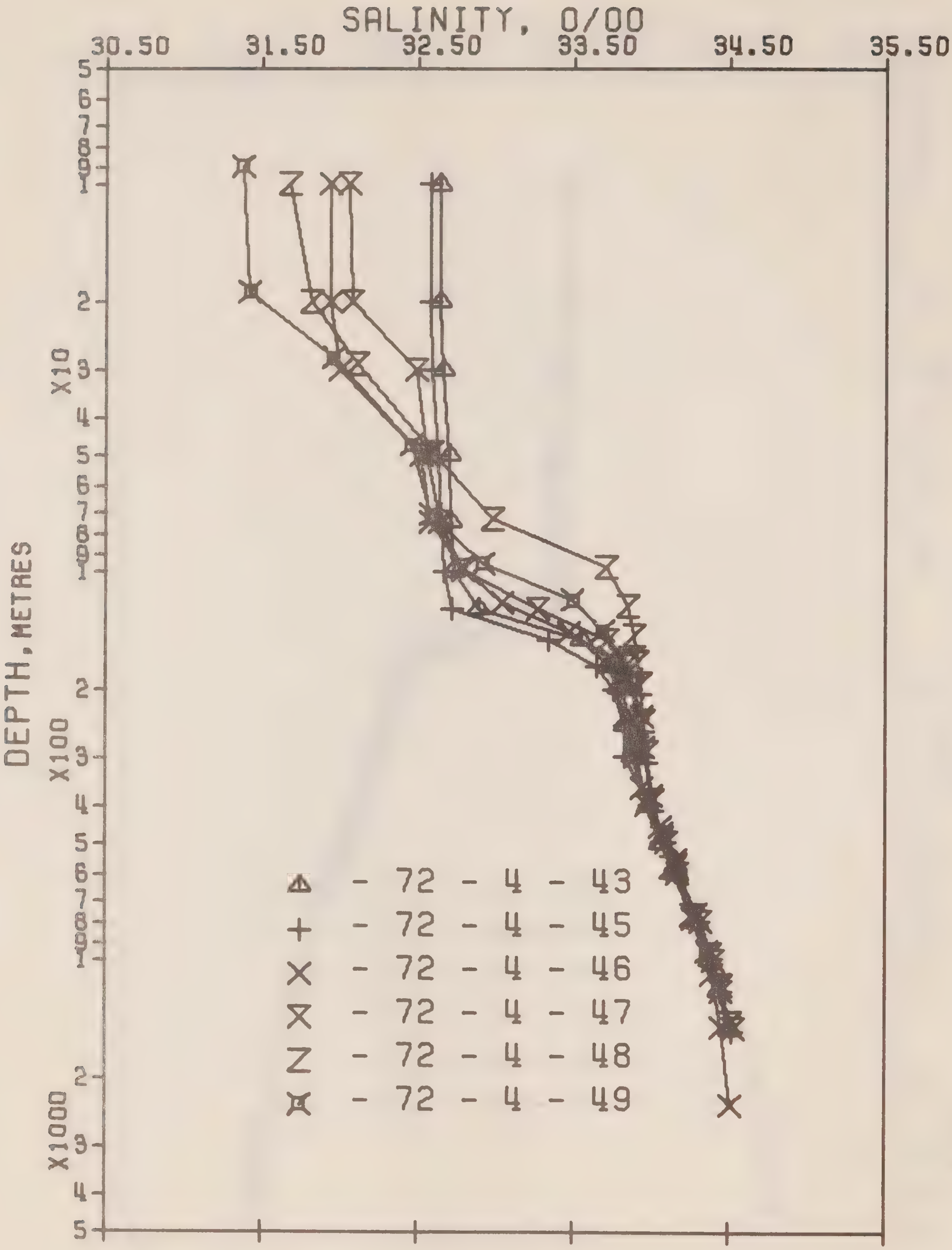


Figure 10 Composite plot of salinity vs $\log_{10}$ depth P-72-4.

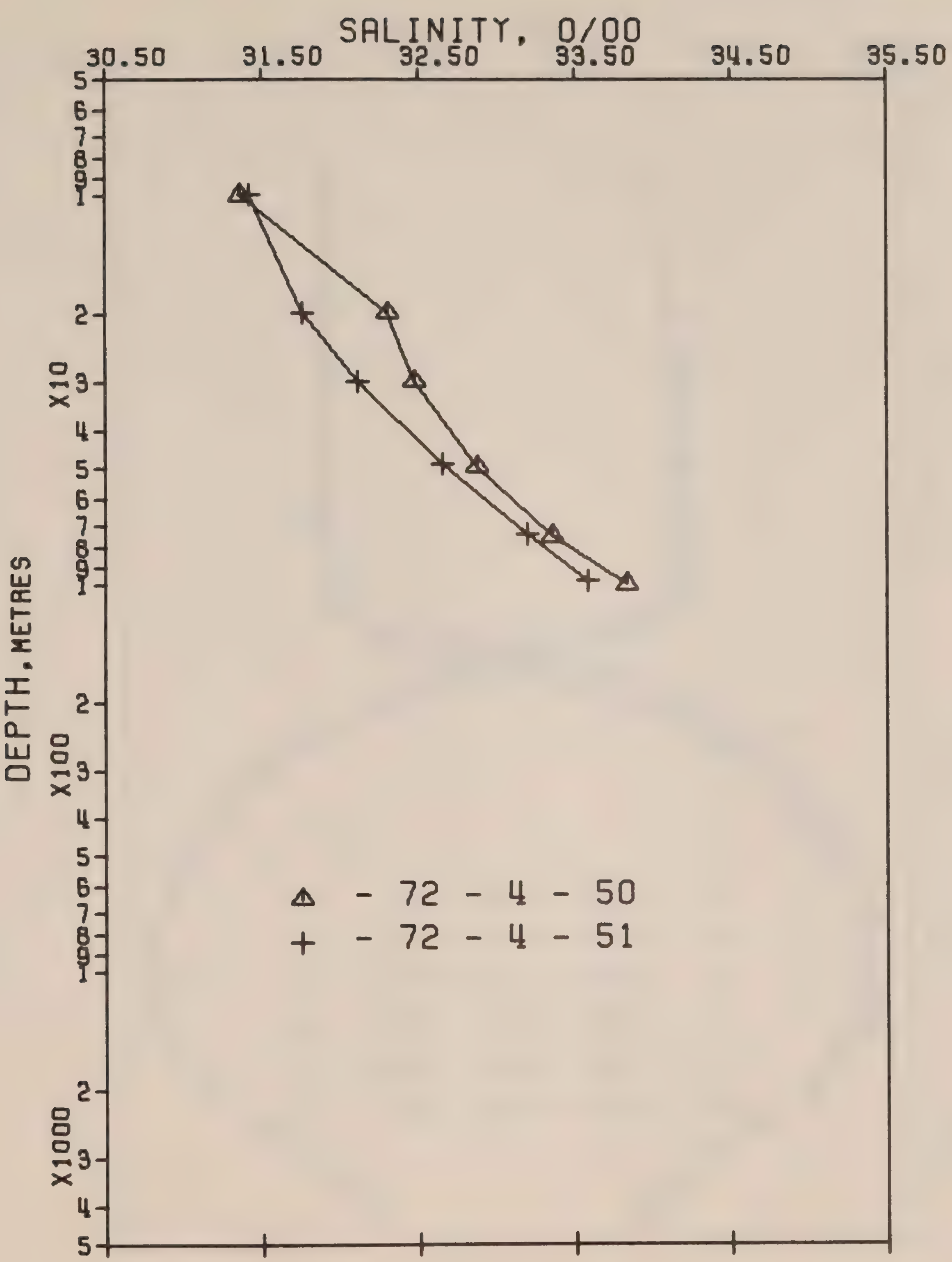


Figure 11 Composite plot of salinity vs $\log_{10}$ depth P-72-4.

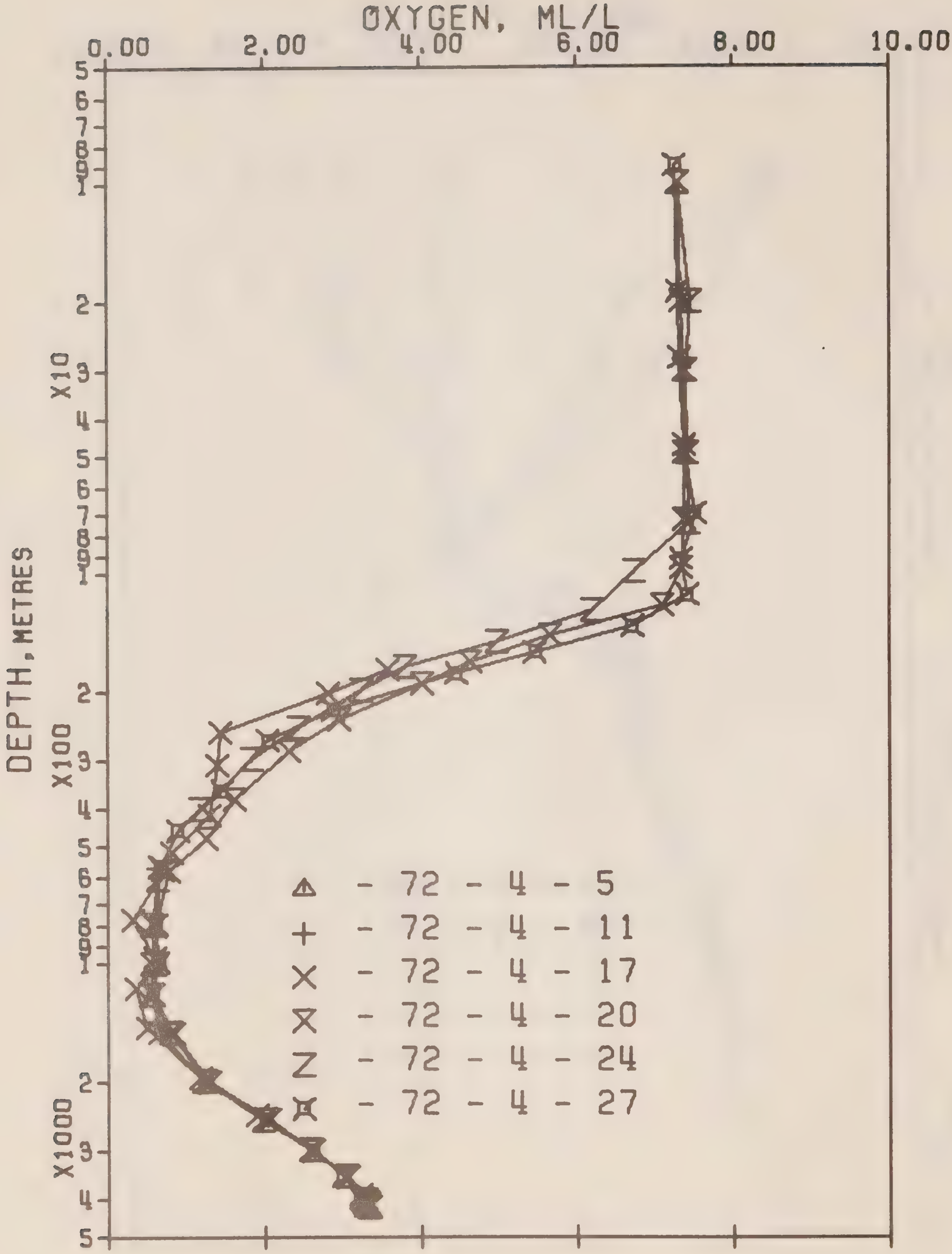


Figure 12 Composite plot of oxygen vs $\log_{10}$ depth P-72-4.

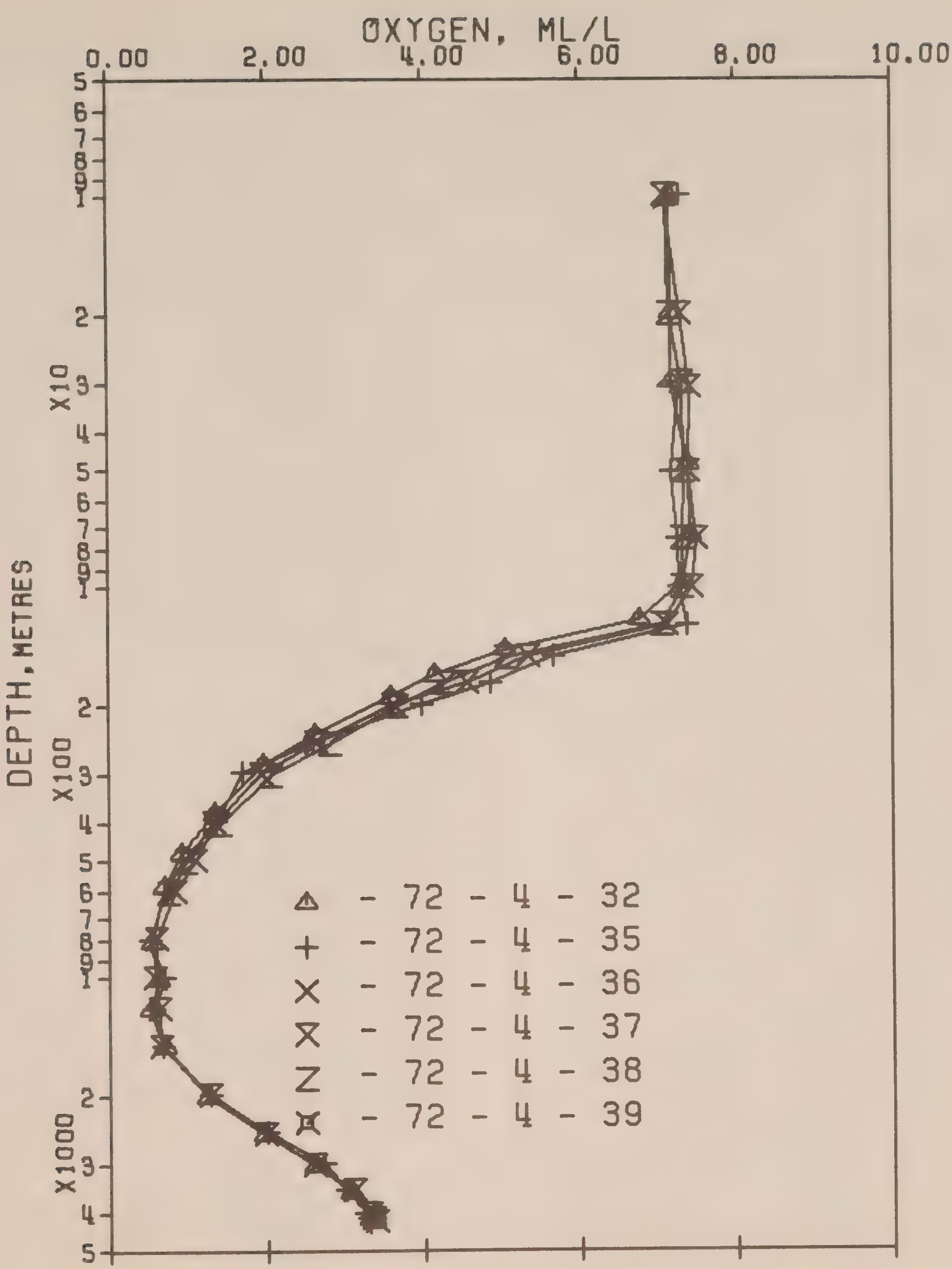
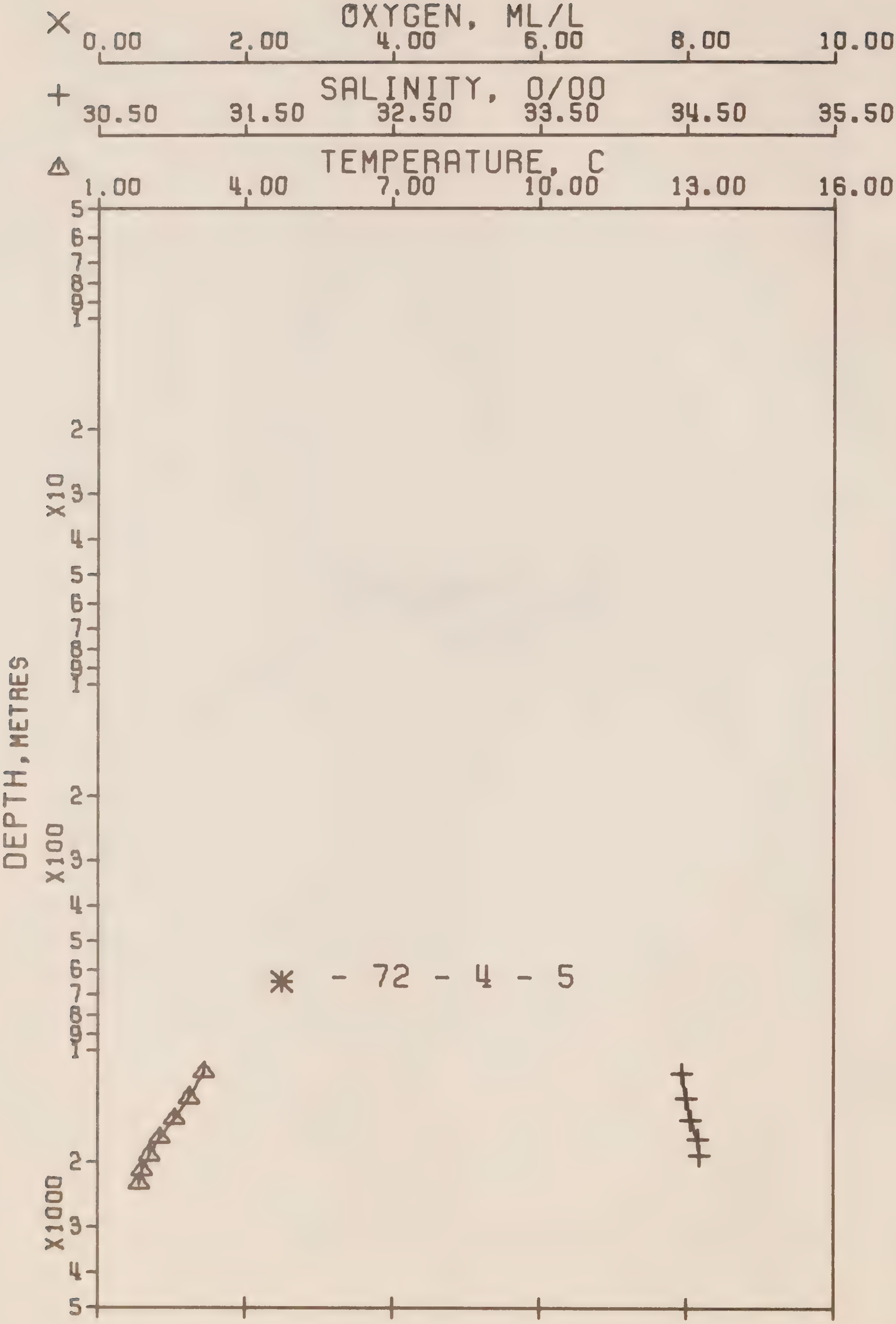


Figure 13 Composite plot of oxygen vs $\log_{10}$ depth P-72-4.

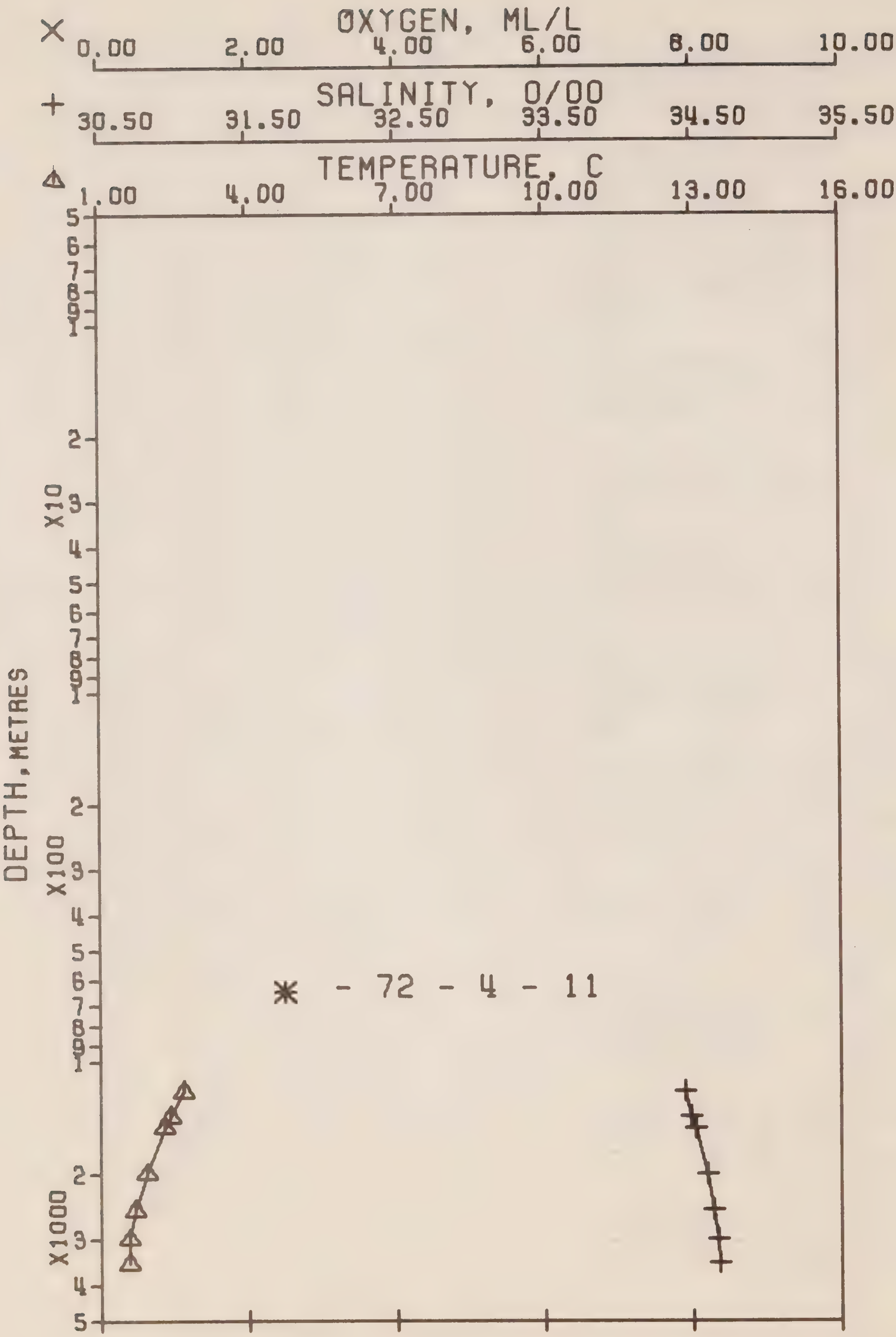
RESULTS OF BOTTLE CASTS

(P-72-4)


OXYGEN, ML/L
0.00
2.00
4.00
6.00
8.00
10.00
SALINITY, 0/00
30.50
31.50
32.50
33.50
34.50
35.50
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 4 - 5

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 5 DATE 13/ 5/72
POSITION 48-46.0 N, 127-40.0 W GMT 8.2
HYDROGRAPHIC CAST DATA

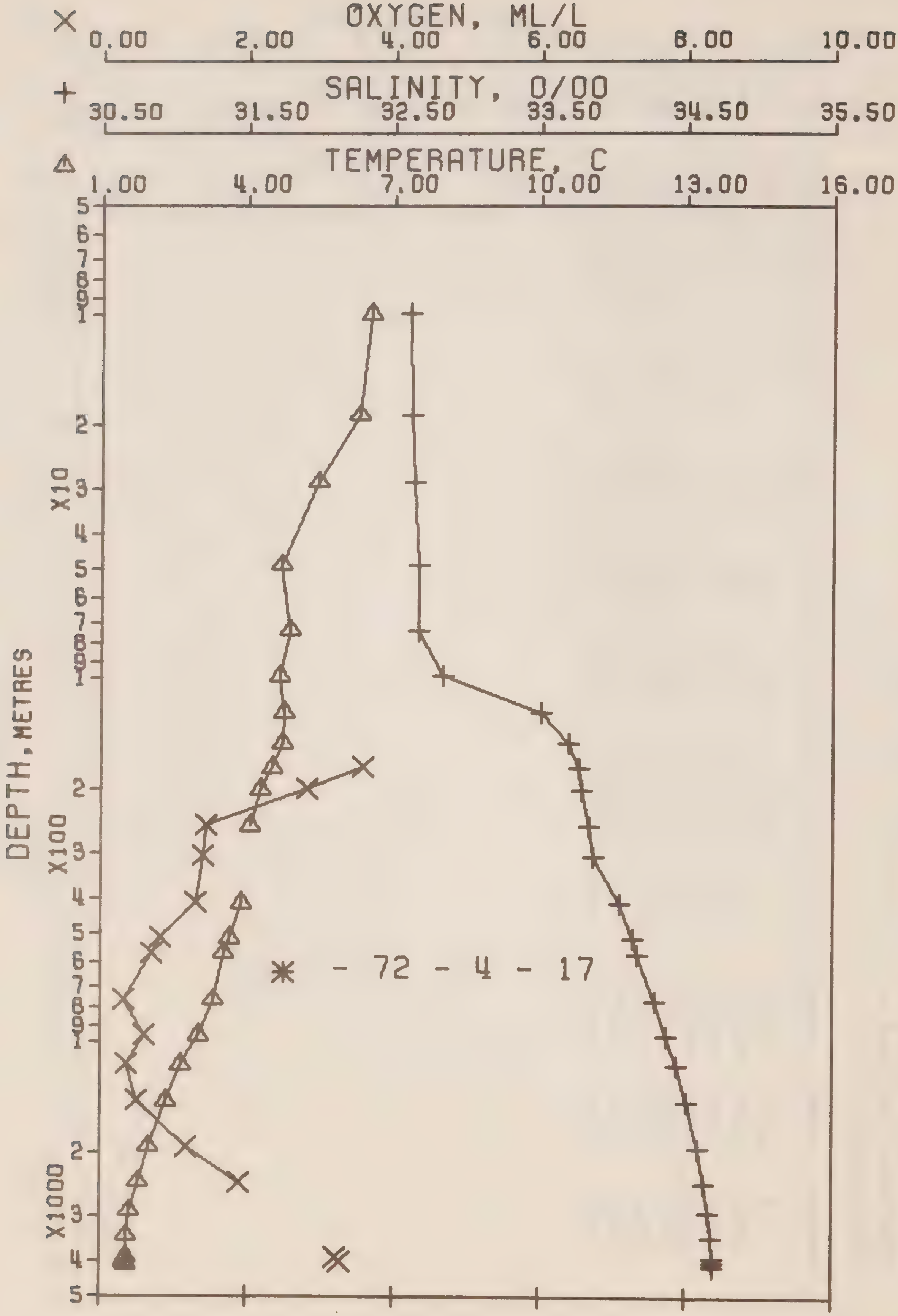
PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	8.79	32.407	0	25.147	282.9	8.79	282.7	0.0	0.0	0.0	1483.
1156	3.16	34.470	1145	27.472	70.3	3.08	61.3	18.96	50.89	0.0	1482.
1353	2.85	34.502	1340	27.526	65.6	2.75	56.1	20.29	68.05	0.0	1484.
1551	2.57	34.529	1535	27.572	61.5	2.46	51.6	21.55	86.70	0.0	1486.
1748	2.27	34.584	1729	27.641	54.9	2.15	45.0	22.70	105.92	0.0	1488.
1945	2.05	34.590	1923	27.664	52.7	1.92	42.8	22.14	115.66	0.0	1490.
2139	1.89	17.250*	2115	13.836	1325.6	1.80	1370.8	33.93	360.52	0.0	1469.
2330	1.83	0.000*	2306	0.001	2621.9	1.78	2735.7	71.51	1222.75	0.0	1450.



X
OXYGEN, ML/L
0.00
2.00
4.00
6.00
8.00
10.00
+
SALINITY, 0/00
30.50
31.50
32.50
33.50
34.50
35.50
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
5
6
7
8
9
1
2
3
4
* - 72 - 4 - 11

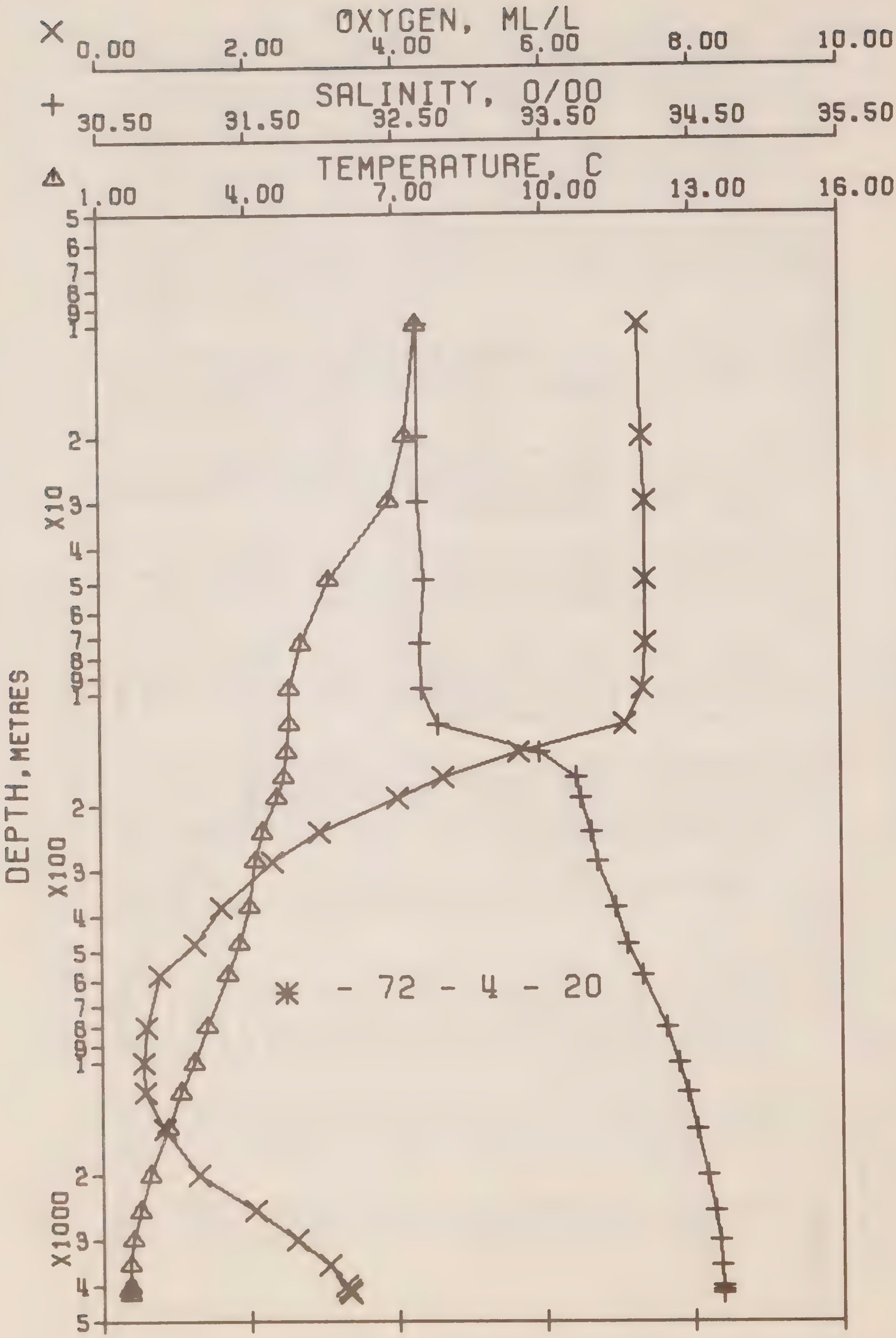
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 11   DATE 14/ 5/72
POSITION 49-26.0 N, 136-40.0 W   GMT 15.0
HYDROGRAPHIC CAST CATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	6.93	32.593	0	25.559	243.8	6.93	243.5	0.0	0.0	0.0	1476.
1215	2.69	34.448	1203	27.497	67.0	2.61	58.9	17.68	54.28	0.0	1480.
1420	2.42	34.495	1405	27.558	61.6	2.32	53.1	18.99	71.97	0.0	1483.
1522	2.30	34.523	1506	27.590	58.6	2.20	50.0	19.60	81.20	0.0	1484.
2032	1.93	34.598	2008	27.680	51.0	1.79	41.3	22.35	131.02	0.0	1491.
2542	1.70	34.642	2509	27.733	46.7	1.52	36.1	24.83	188.75	0.0	1499.
3049	1.58	34.670	3005	27.764	44.6	1.35	32.8	27.12	254.25	0.0	1507.
3550	1.56	34.680	3495	27.773	45.1	1.28	31.6	29.37	329.70	0.0	1515.


OXYGEN, ML/L
0.00
2.00
4.00
6.00
8.00
10.00
SALINITY, 0/00
30.50
31.50
32.50
33.50
34.50
35.50
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 4 - 17

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 17 DATE 17/ 5/72
POSITIUN 50- 0.0 N, 145- 0.0 W GMT 19.7
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	6.52	32.605	0	25.622	237.8	6.52	237.6	0.0	0.0	0.0	1474.
10	6.51	32.609	10	25.626	237.4	6.51	237.1	0.24	0.01	0.0	1474.
19	6.27	32.617	19	25.663	234.1	6.27	233.6	0.45	0.04	0.0	1473.
29	5.45	32.645	29	25.785	222.6	5.45	222.1	0.68	0.10	0.0	1470.
49	4.70	32.670	49	25.888	212.9	4.70	212.2	1.12	0.27	0.0	1467.
74	4.88	32.674	74	25.872	214.7	4.87	213.7	1.66	0.62	0.0	1469.
100	4.67	32.836	99	26.023	200.6	4.66	199.4	2.19	1.09	0.0	1468.
126	4.76	33.510	125	26.547	151.1	4.75	149.6	2.65	1.61	0.0	1470.
152	4.71	33.703	151	26.705	136.4	4.70	134.6	3.02	2.14	0.0	1471.
178	4.50	33.769	177	26.780	129.4	4.49	127.4	3.36	2.72	3.58	1470.
204	4.28	33.788	203	26.819	125.9	4.27	123.7	3.70	3.37	2.82	1470.
258	4.05	33.843	256	26.886	119.9	4.03	117.3	4.35	4.92	1.44	1470.
312	3.97*	33.871	310	26.917	117.4	3.95	114.4	5.00	6.80	1.40	1470.
419	3.89	34.046	416	27.064	104.4	3.86	100.4	6.19	11.22	1.30	1472.
523	3.63	34.141	519	27.165	95.4	3.59	90.7	7.22	16.19	0.81	1473.
577	3.53	34.170	572	27.198	92.5	3.49	87.6	7.73	19.01	0.70	1473.
775	3.32	34.291	768	27.315	82.7	3.27	76.4	9.46	30.94	0.32	1476.
974	3.00	34.372	965	27.409	74.5	2.93	67.4	11.02	44.90	0.59	1478.
1173	2.66	34.442	1161	27.495	66.9	2.58	59.2	12.42	60.21	0.36	1480.
1472	2.34	34.513	1456	27.579	59.6	2.24	51.1	14.30	85.53	0.50	1483.
1970	2.00	34.587	1946	27.665	52.4	1.86	42.7	17.06	133.94	1.18	1490.
2469	1.77	34.628	2436	27.716	48.4	1.59	37.6	19.56	190.51	1.91	1498.
2970	1.61	34.657	2927	27.751	45.7	1.39	34.1	21.90	255.59	0.0	1505.
3473	1.54	34.677	3419	27.772	44.8	1.27	31.7	24.17	330.06	0.0	1514.
3979	1.53	34.687	3913	27.781	45.3	1.21	30.6	26.45	416.67	3.22	1522.
4081	1.52	34.688	4012	27.783	45.3	1.19	30.4	26.91	435.58	3.28	1524.
4184	1.53	34.689	4112	27.783	45.7	1.19	30.3	27.38	455.25	0.0	1526.



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Δ TEMPERATURE, C
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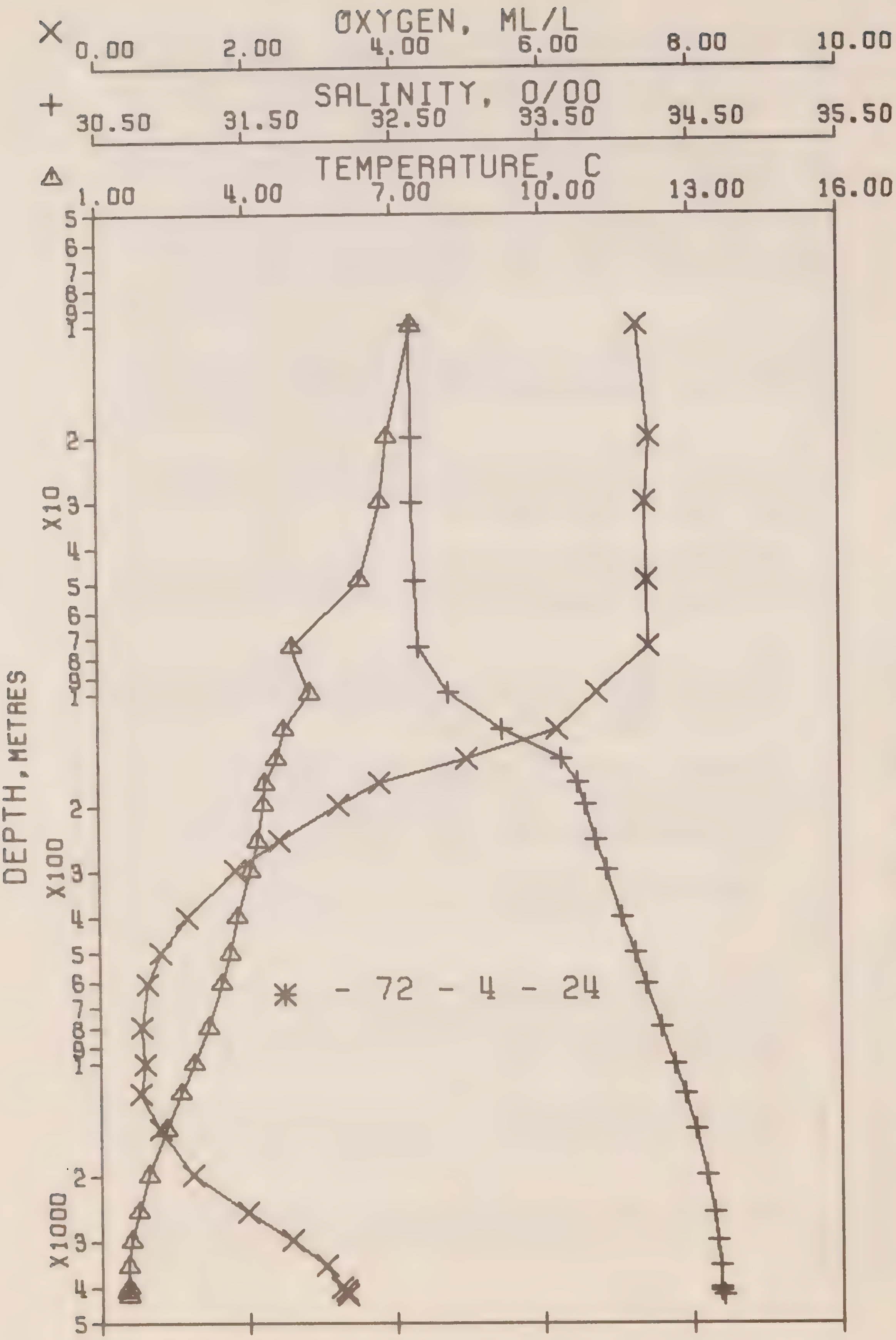
DEPTH, METRES
X10
X100
X1000
* - 72 - 4 - 20

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 20 DATE 22/ 5/72
POSITION 50- 0.0 N. 145- 0.0 W GMT 1.3
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	7.52	32.663	0	25.533	246.2	7.52	246.0	0.0	0.0	7.27	1478.
10	7.46	32.661	10	25.540	245.7	7.46	245.4	0.25	0.01	7.30	1478.
20	7.20	32.660	20	25.575	242.5	7.20	242.0	0.49	0.05	7.34	1477.
30	6.89	32.657	30	25.615	238.9	6.89	238.2	0.74	0.11	7.38	1476.
49	5.64	32.699	49	25.805	220.9	5.64	220.1	1.18	0.29	7.38	1471.
73	5.08	32.672	73	25.848	217.0	5.07	216.0	1.70	0.62	7.39	1469.
98	4.85	32.677	97	25.877	214.3	4.84	213.2	2.22	1.08	7.34	1469.
122	4.84	32.789	121	25.967	206.0	4.83	204.7	2.74	1.65	7.10	1469.
145	4.77	33.473	144	26.516	154.2	4.76	152.5	3.16	2.22	5.65	1470.
169	4.71	33.718	168	26.717	135.5	4.70	133.4	3.50	2.77	4.65	1471.
192	4.57	33.755	191	26.762	131.4	4.56	129.2	3.81	3.34	4.03	1471.
240	4.27	33.819	238	26.844	123.8	4.25	121.3	4.41	4.66	2.96	1470.
286	4.11	33.863	284	26.896	119.3	4.09	116.4	4.97	6.17	2.32	1470.
381	4.01	33.978	378	26.998	110.4	3.98	106.7	6.06	9.87	1.61	1472.
480	3.79	34.057	476	27.083	102.9	3.76	98.6	7.12	14.51	1.25	1473.
584	3.55	34.164	579	27.191	93.2	3.51	88.2	8.14	20.04	0.78	1473.
805	3.14	34.319	798	27.354	78.9	3.08	72.7	10.02	33.38	0.61	1475.
1011	2.85	34.401	1001	27.445	71.0	2.78	64.0	11.56	47.58	0.56	1478.
1216	2.58	34.462	1204	27.518	64.7	2.50	57.0	12.95	63.37	0.58	1480.
1525	2.31	34.519	1508	27.586	59.0	2.21	50.4	14.84	89.90	0.84	1484.
2036	1.95	34.593	2011	27.674	51.6	1.81	41.8	17.65	140.83	1.30	1491.
2546	1.74	34.638	2512	27.726	47.5	1.56	36.6	20.17	199.59	2.05	1499.
3057	1.60	34.672	3012	27.764	44.8	1.37	32.8	22.51	266.46	2.63	1507.
3568	1.55	34.680	3512	27.774	45.0	1.27	31.5	24.79	343.69	3.05	1515.
4081	1.54	34.688	4012	27.781	45.7	1.21	30.5	27.13	434.69	3.28	1524.
4185	1.52	34.691	4113	27.785	45.4	1.18	30.0	27.60	454.57	3.32	1526.
4287	1.55	34.692	4213	27.784	46.1	1.19	30.1	28.07	474.84	3.35	1528.



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△ TEMPERATURE, C
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DEPTH, METRES
X10
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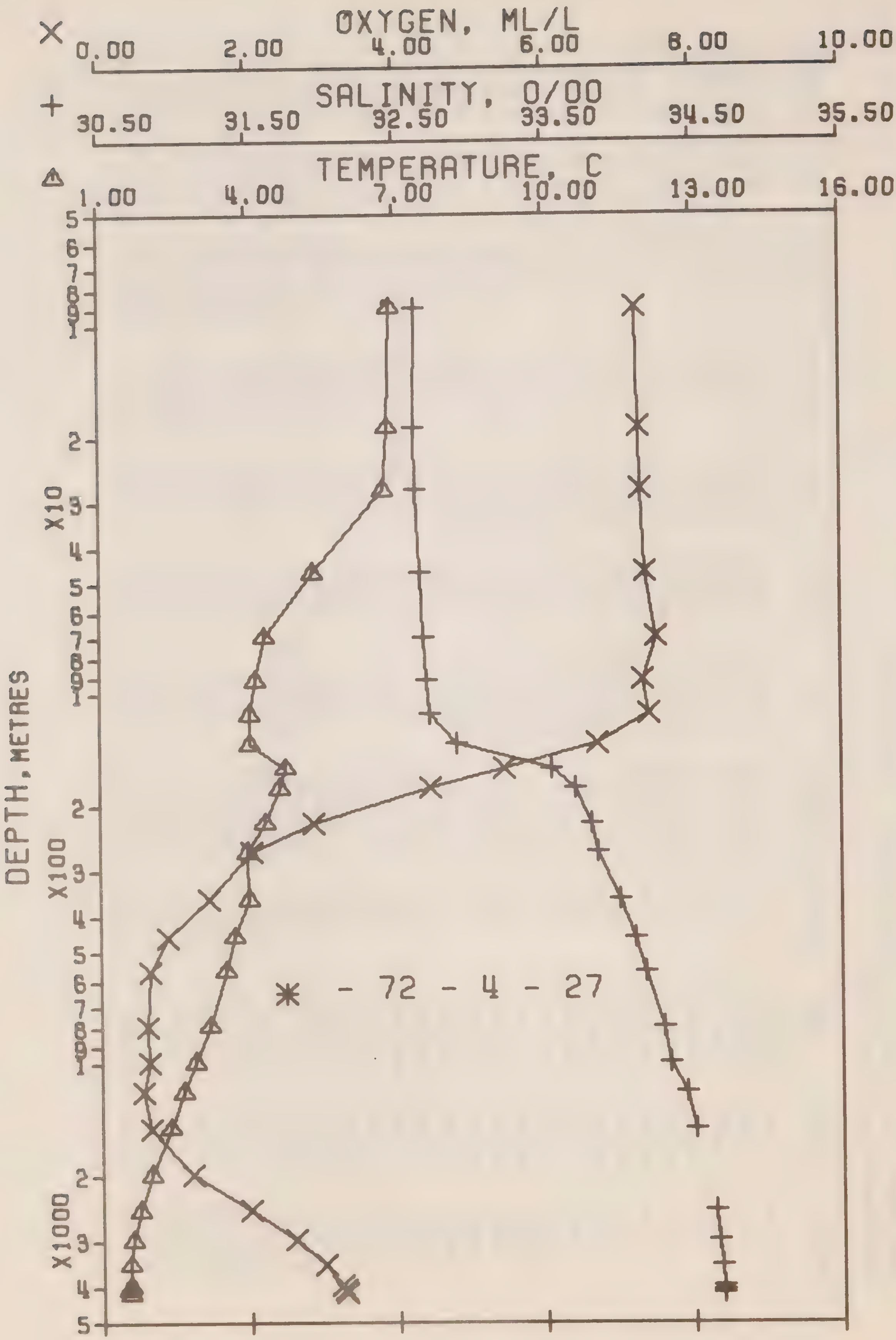
X1000
* - 72 - 4 - 24

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 24 DATE 27/ 5/72
POSITION 50- 0.0 N. 145- 0.0 W GMT 19.8
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	7.44	32.623	0	25.513	248.1	7.44	247.9	0.0	0.0	7.27	1478.
10	7.40	32.625	10	25.520	247.6	7.40	247.2	0.25	0.01	7.29	1478.
20	6.89	32.632	20	25.595	240.6	6.89	240.1	0.50	0.05	7.47	1476.
30	6.73	32.632	30	25.616	238.7	6.73	238.1	0.74	0.11	7.40	1475.
49	6.31	32.646	49	25.681	232.7	6.31	231.8	1.19	0.30	7.42	1474.
74	4.92	32.667	74	25.862	215.6	4.91	214.7	1.75	0.65	7.45	1469.
100	5.28	32.867	99	25.980	204.8	5.27	203.5	2.28	1.12	6.74	1471.
125	4.75	33.229	124	26.325	172.1	4.74	170.6	2.76	1.67	6.21	1470.
150	4.59	33.626	149	26.657	140.8	4.58	139.1	3.15	2.22	4.98	1470.
175	4.36	33.737	174	26.770	130.3	4.35	128.4	3.49	2.78	3.81	1470.
200	4.34	33.789	199	26.813	126.5	4.33	124.3	3.81	3.39	3.23	1470.
251	4.22	33.862	249	26.884	120.2	4.20	117.6	4.43	4.82	2.44	1470.
301	4.06	33.926	299	26.951	114.1	4.04	111.2	5.02	6.48	1.85	1471.
403	3.80	34.034	400	27.063	104.2	3.77	100.5	6.13	10.47	1.18	1471.
506	3.63	34.119	502	27.148	96.9	3.59	92.3	7.17	15.26	0.82	1472.
609	3.46	34.190	604	27.221	90.5	3.42	85.4	8.13	20.74	0.64	1473.
800	3.19	34.292	793	27.328	81.5	3.13	75.2	9.77	32.51	0.56	1476.
1005	2.89	34.382	995	27.427	72.9	2.82	65.7	11.34	46.98	0.60	1478.
1208	2.62	34.448	1196	27.503	66.1	2.54	58.4	12.75	62.89	0.54	1480.
1514	2.31	34.516	1497	27.584	59.2	2.21	50.6	14.66	89.29	0.81	1484.
2022	1.96	34.589	1997	27.670	51.9	1.82	42.2	17.45	139.75	1.24	1491.
2531	1.74	34.638	2497	27.726	47.4	1.56	36.6	19.97	198.08	1.99	1499.
3040	1.60	34.660	2996	27.754	45.6	1.37	33.7	22.33	265.08	2.58	1507.
3552	1.54	34.678	3496	27.773	44.9	1.26	31.6	24.63	342.58	3.04	1515.
4067	1.53	34.684	3998	27.779	45.7	1.20	30.7	26.96	432.97	3.25	1524.
4169	1.52	34.684	4098	27.779	45.9	1.18	30.6	27.43	452.72	3.30	1526.
4273	1.54	34.696	4199	27.788	45.6	1.18	29.7	27.91	473.15	3.33	1528.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SALINITY, 0/00
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TEMPERATURE, C
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DEPTH, METRES
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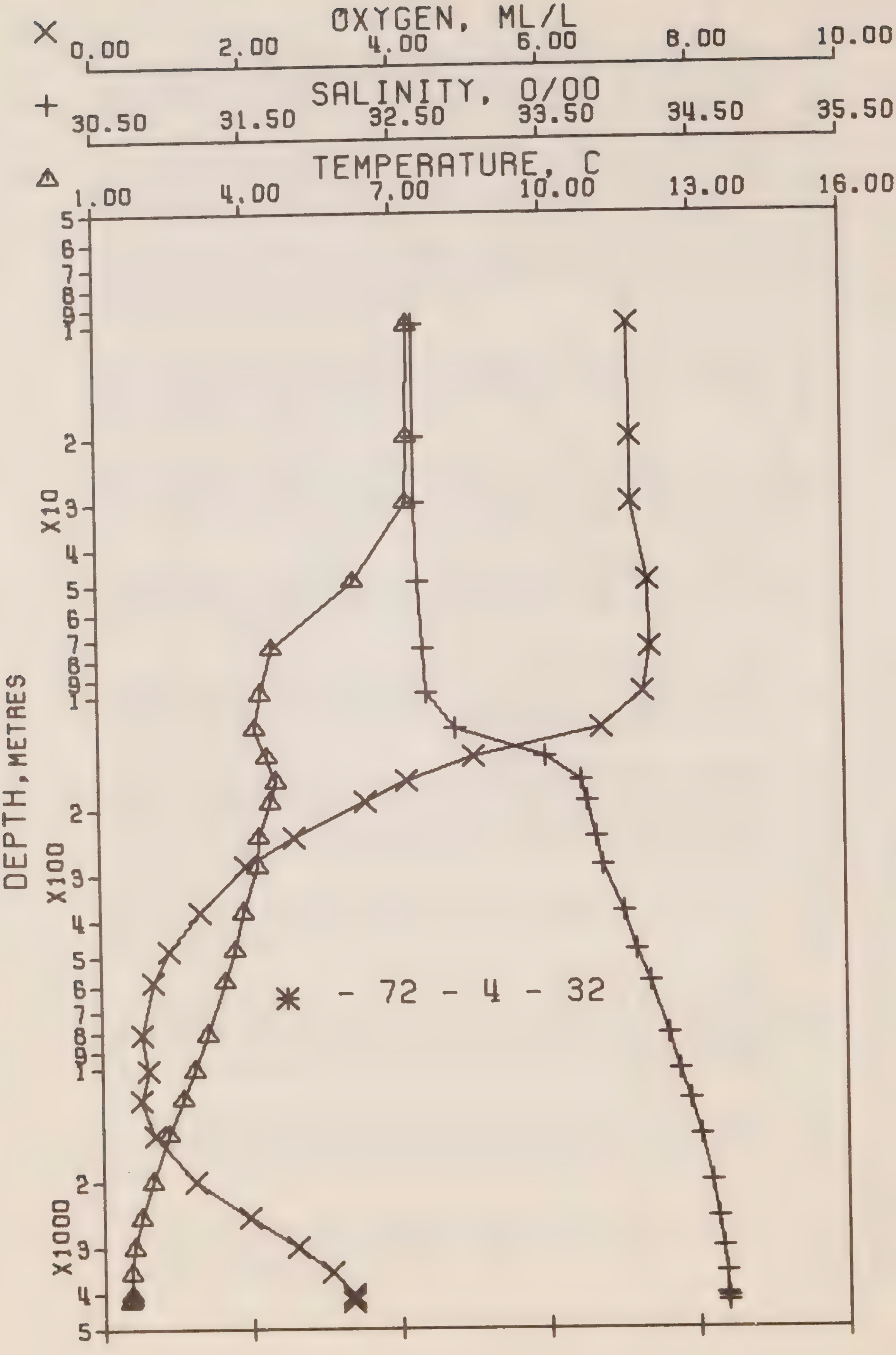
X1000
* - 72 - 4 - 27

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 27 DATE 2/ 6/72
POSITION 50- 0.0 N, 145- 0.0 W GMT 19.6
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	6.93	32.635	0	25.592	240.6	6.93	240.4	0.0	0.0	7.24	1476.
9	6.91	32.636	9	25.595	240.4	6.91	240.1	0.22	0.01	7.27	1476.
19	6.86	32.633	19	25.600	240.1	6.86	239.6	0.46	0.04	7.29	1476.
28	6.77	32.636	28	25.614	238.9	6.77	238.3	0.68	0.10	7.33	1475.
47	5.31	32.671	47	25.821	219.3	5.31	218.6	1.12	0.27	7.39	1470.
70	4.32	32.693	70	25.946	207.5	4.32	206.6	1.61	0.56	7.51	1466.
93	4.15	32.709	92	25.976	204.7	4.14	203.8	2.06	0.94	7.33	1466.
115	4.04	32.729	114	26.003	202.3	4.03	201.2	2.51	1.42	7.42	1466.
138	4.04	32.906	137	26.144	189.2	4.03	187.9	2.97	2.01	6.71	1466.
160	4.75	33.550	159	26.579	148.4	4.74	146.5	3.35	2.58	5.46	1471.
181	4.64	33.713	180	26.721	135.2	4.63	133.0	3.64	3.09	4.45	1471.
226	4.32	33.822	224	26.841	124.0	4.30	121.6	4.21	4.27	2.89	1470.
270	3.96	33.865	268	26.913	117.4	3.94	114.8	4.75	5.62	2.05	1470.
362	3.99	34.014	359	27.028	107.3	3.96	103.8	5.77	8.93	1.46	1471.
460	3.71	34.107	456	27.130	98.2	3.68	94.1	6.78	13.13	0.90	1472.
568	3.52	34.178	563	27.205	91.8	3.48	86.9	7.80	18.49	0.66	1473.
798	3.19	34.297	791	27.332	81.0	3.13	74.8	9.78	32.26	0.61	1476.
1001	2.89	34.341	991	27.394	75.9	2.82	68.8	11.37	46.85	0.65	1478.
1203	2.64	34.449	1191	27.502	66.3	2.56	58.5	12.81	62.98	0.57	1480.
1508	2.37	34.512	1491	27.575	60.2	2.27	51.4	14.71	89.33	0.67	1484.
2018	2.00	34.589*	1993	27.667	52.5	1.86	42.5	17.57	140.62	1.22	1491.
2528	1.75	34.637	2494	27.725	47.7	1.57	36.8	20.10	199.41	2.00	1499.
3037	1.61	34.664	2993	27.757	45.4	1.38	33.5	22.46	266.32	2.60	1507.
3543	1.54	34.680	3487	27.775	44.8	1.26	31.5	24.73	342.48	2.99	1515.
4044	1.53	34.686	3976	27.780	45.6	1.20	30.6	27.00	430.33	3.22	1524.
4143	1.52	34.689	4072	27.783	45.4	1.18	30.2	27.45	449.02	3.26	1525.
4242	1.54	34.692	4169	27.784	45.8	1.19	30.0	27.90	468.41	3.28	1527.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TEMPERATURE, C
1.00
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DEPTH, METRES
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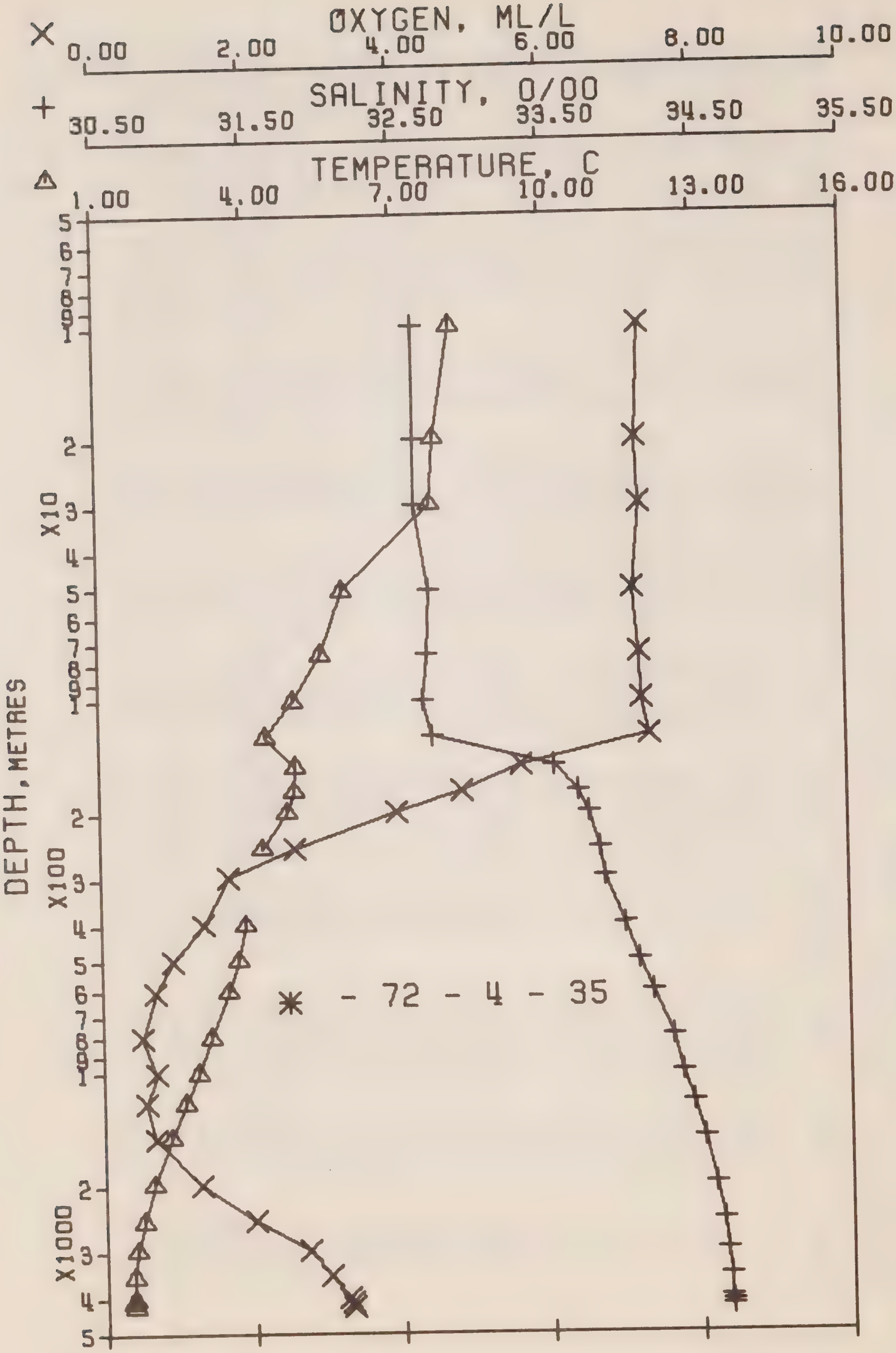
X100
X1000
* - 72 - 4 - 32

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 32 DATE 8/ 6/72
POSITION 50- 0.0 N, 145- 0.0 W GMT 20.4
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	7.32	32.639	0	25.542	245.4	7.32	245.2	0.0	0.0	7.12	1477.
10	7.30	32.637	10	25.543	245.3	7.30	245.0	0.25	0.01	7.16	1477.
20	7.27	32.636	20	25.547	245.2	7.27	244.7	0.49	0.05	7.17	1477.
30	7.25	32.639	30	25.552	244.8	7.25	244.2	0.74	0.11	7.18	1477.
49	6.16	32.658	49	25.709	230.0	6.16	229.2	1.20	0.30	7.40	1473.
74	4.50	32.689	74	25.924	209.6	4.49	208.7	1.75	0.64	7.41	1467.
99	4.27	32.707	98	25.962	206.1	4.26	205.1	2.25	1.09	7.32	1467.
123	4.14	32.903	122	26.131	190.3	4.13	189.1	2.73	1.64	6.77	1467.
146	4.39	33.500	145	26.579	148.2	4.38	146.6	3.13	2.17	5.04	1469.
170	4.57	33.741	169	26.750	132.3	4.56	130.2	3.46	2.71	4.14	1470.
193	4.46	33.781	192	26.794	128.3	4.45	126.1	3.76	3.27	3.58	1470.
241	4.20	33.842	239	26.870	121.4	4.18	118.8	4.35	4.57	2.62	1470.
288	4.18	33.865	286	26.906	118.3	4.16	115.4	4.92	6.10	1.97	1471.
384	3.88	34.025	381	27.048	105.6	3.85	101.9	5.99	9.77	1.34	1471.
484	3.70	34.098	480	27.124	99.0	3.67	94.6	7.01	14.29	0.92	1472.
589	3.49	34.189	584	27.217	90.8	3.45	85.7	8.01	19.73	0.70	1473.
817	3.13	34.313	809	27.350	79.3	3.07	73.1	9.92	33.48	0.53	1476.
1018	2.85	34.384	1008	27.432	72.3	2.78	65.2	11.45	47.72	0.62	1478.
1222	2.61	34.448	1209	27.504	66.1	2.53	58.3	12.85	63.77	0.52	1480.
1526	2.31	34.517	1509	27.584	59.2	2.21	50.5	14.75	90.32	0.71	1484.
2037	1.98	34.587	2012	27.667	52.5	1.84	42.5	17.58	141.69	1.24	1491.
2550	1.76	34.632	2516	27.720	48.2	1.58	37.2	20.15	201.78	1.97	1499.
3065	1.61	34.656	3020	27.750	46.1	1.38	34.1	22.56	270.97	2.60	1507.
3581	1.54	34.676	3524	27.772	45.2	1.26	31.7	24.91	350.35	3.05	1516.
4096	1.53	34.681	4027	27.776	46.1	1.20	30.9	27.26	442.50	3.33	1524.
4199	1.53	34.686	4127	27.780	46.0	1.18	30.5	27.73	462.48	3.34	1526.
4303	1.52	34.690	4228	27.784	45.8	1.16	30.0	28.21	483.12	3.33	1528.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TEMPERATURE, C
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DEPTH, METRES
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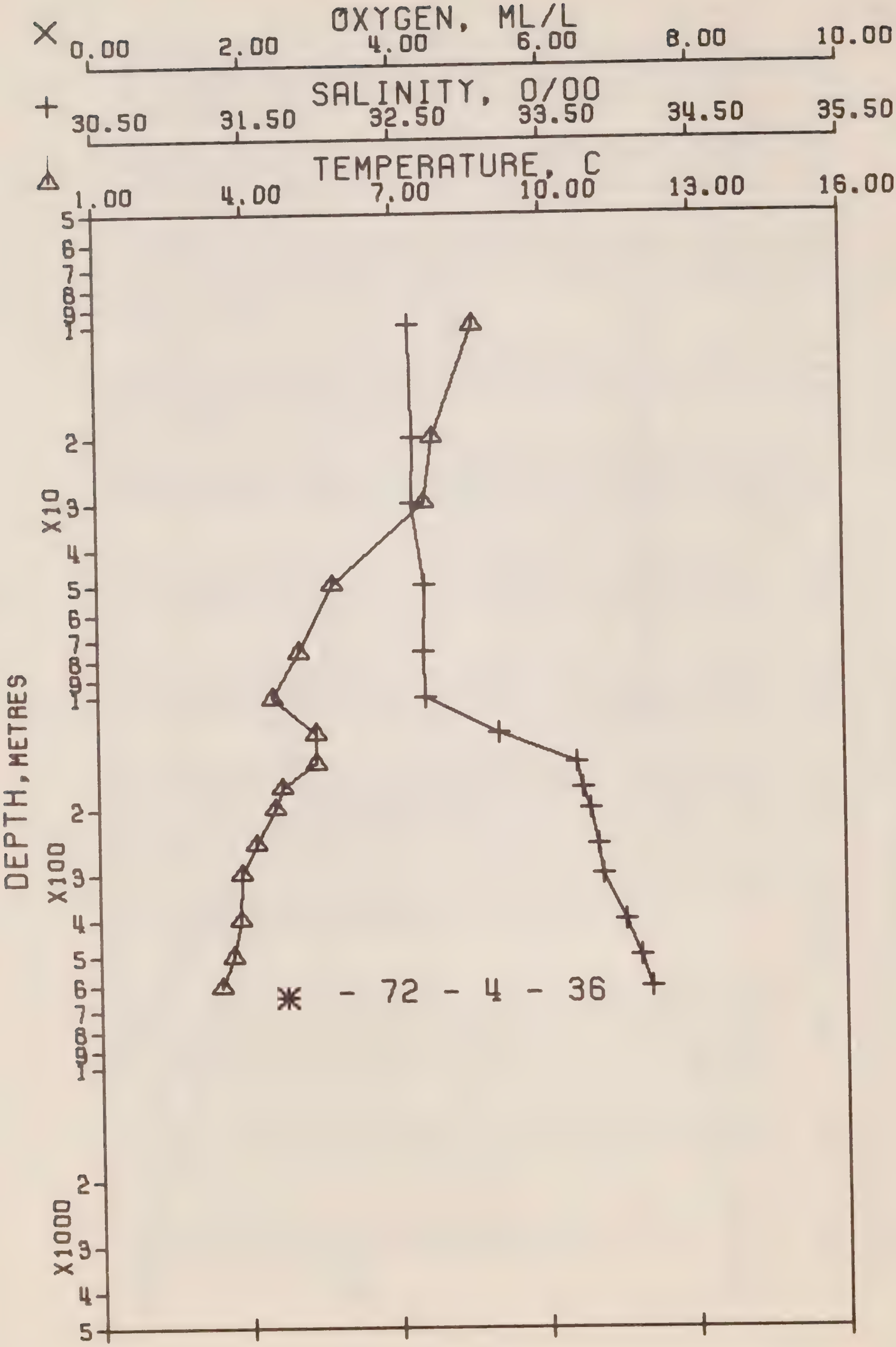
X100
X1000
* - 72 - 4 - 35

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 35 CATE 14/ 6/72
POSITION 50- 0.0 N. 145- 0.0 W GMT 19.2
HYDROGRAPHIC CAST CATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	8.80	32.633	0	25.322	266.3	8.80	266.1	0.0	0.0	7.09	1483.
10	8.18	32.641	10	25.421	257.0	8.18	256.6	0.26	0.01	7.30	1481.
20	7.81	32.640	20	25.474	252.1	7.81	251.5	0.52	0.05	7.23	1479.
30	7.71	32.645	30	25.492	250.5	7.71	249.8	0.77	0.12	7.27	1479.
51	5.91	32.729	51	25.796	221.7	5.91	221.0	1.27	0.32	7.18	1473.
76	5.48	32.711	76	25.833	218.5	5.47	217.4	1.82	0.68	7.26	1471.
102	4.90	32.683	101	25.877	214.5	4.89	213.3	2.37	1.18	7.29	1469.
127	4.32	32.745	126	25.987	204.0	4.31	202.8	2.90	1.80	7.38	1467.
152	4.94	33.549	151	26.557	150.4	4.93	148.6	3.35	2.43	5.66	1471.
177	4.90	33.708	176	26.688	138.3	4.89	136.2	3.70	3.03	4.86	1472.
201	4.74	33.782	200	26.764	131.3	4.72	128.9	4.03	3.66	3.98	1472.
252	4.23	33.853	250	26.876	120.9	4.21	118.3	4.66	5.12	2.59	1470.
301	4.01*	33.879	299	26.919	117.1	3.99	114.2	5.25	6.78	1.71	1470.
402	3.88	34.015	399	27.040	106.5	3.85	102.7	6.38	10.82	1.36	1472.
504	3.73	34.103	500	27.125	99.1	3.69	94.5	7.42	15.65	0.95	1473.
609	3.51	34.188	604	27.214	91.2	3.47	86.0	8.42	21.32	0.70	1474.
810	3.15	34.317	803	27.351	79.2	3.09	72.9	10.13	33.63	0.52	1476.
1012	2.88	34.385	1002	27.430	72.5	2.81	65.4	11.65	47.79	0.70	1478.
1212	2.61	34.452	1200	27.507	65.8	2.53	58.0	13.03	63.48	0.55	1480.
1513	2.31	34.521	1496	27.588	58.9	2.21	50.2	14.89	89.31	0.68	1484.
2014	1.97	34.590	1989	27.670	52.0	1.83	42.2	17.64	138.79	1.28	1491.
2519	1.74	34.638	2485	27.726	47.4	1.56	36.6	20.14	196.36	2.00	1498.
3028	1.61	34.659	2984	27.753	45.8	1.39	33.8	22.50	263.23	2.72	1506.
3548	1.54	34.680	3492	27.775	44.8	1.26	31.5	24.85	341.88	3.00	1515.
4080	1.53	34.684	4011	27.779	45.8	1.20	30.7	27.26	435.55	3.25	1524.
4188	1.52	34.686	4116	27.781	45.8	1.18	30.4	27.75	456.33	3.28	1526.
4297	1.54	34.688	4222	27.781	46.3	1.18	30.3	28.25	477.98	3.31	1528.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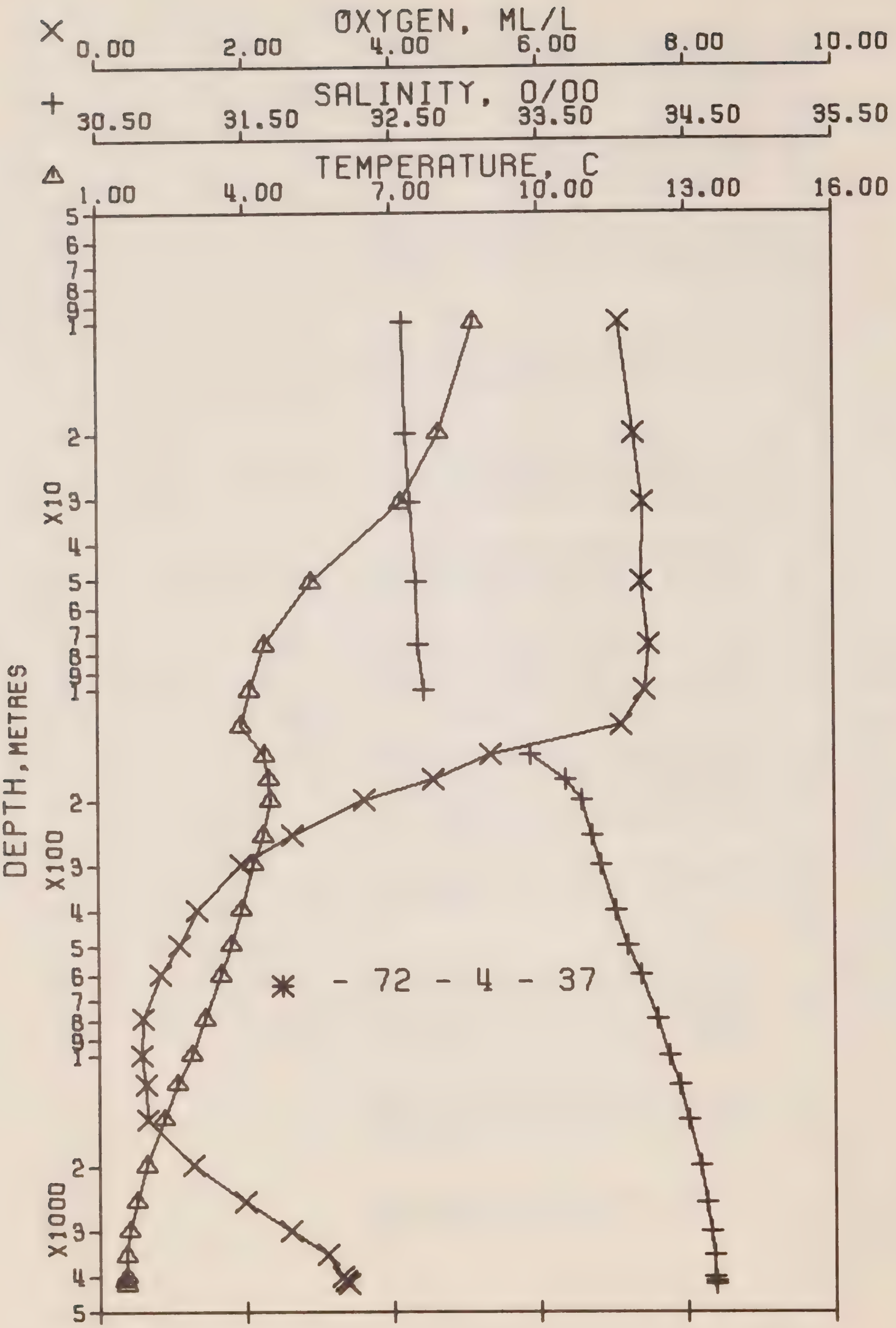
6.00
8.00
10.00
SALINITY, 0/00
30.50
31.50
32.50
33.50
34.50
35.50
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 4 - 36

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 36 DATE 17/ 6/72
POSITION 50- 0.0 N. 145- 0.0 W GMT 19.1
HYDROGRAPHIC CAST DATA

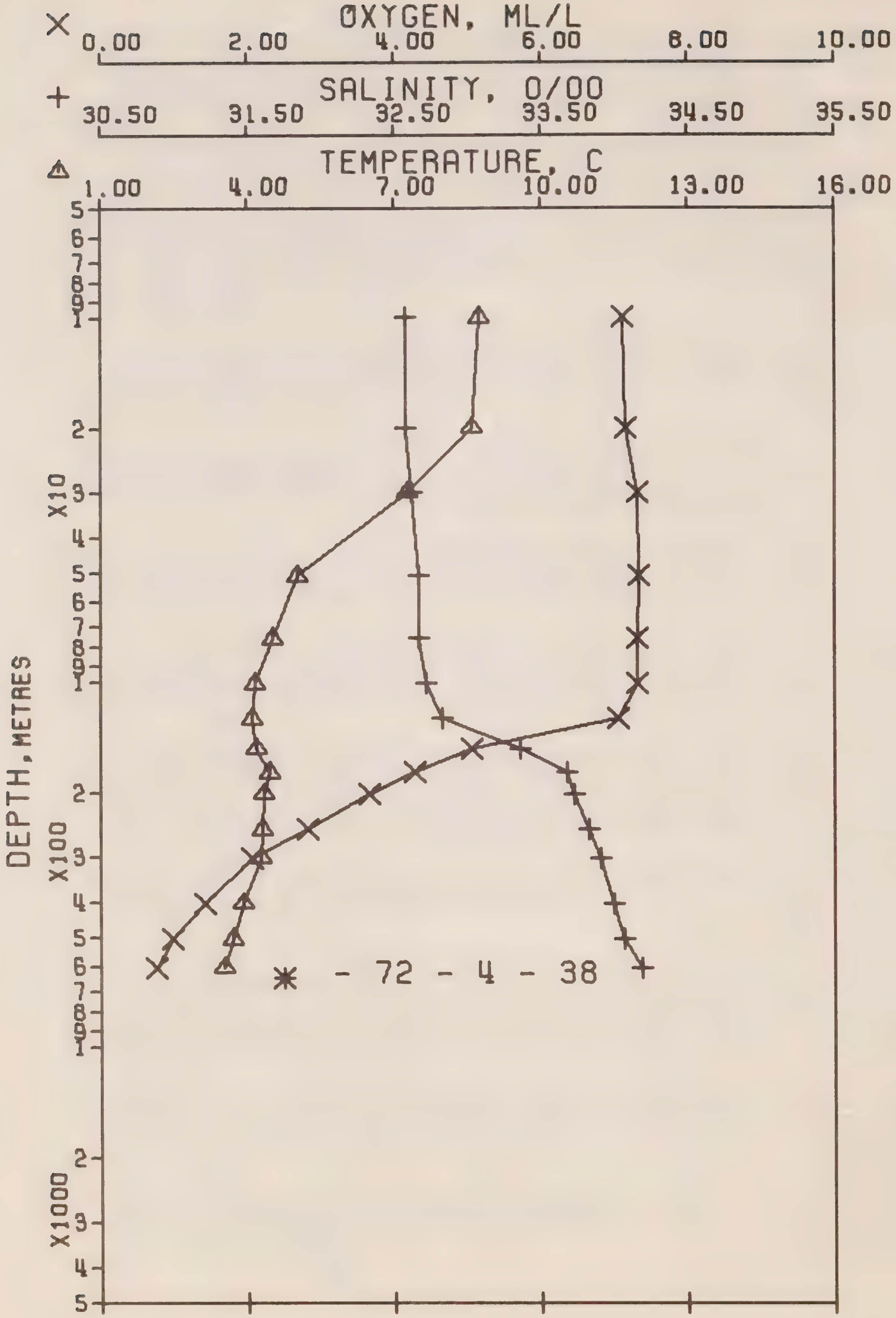
PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	PUT. EN	OXY	SOUND
0	8.64	32.613	0	25.331	265.4	8.64	265.2	0.0	0.0	0.0	1482.
10	8.61	32.613	10	25.335	265.2	8.61	264.8	0.27	0.01	0.0	1482.
20	7.79	32.630	20	25.469	252.6	7.79	252.1	0.53	0.05	0.0	1479.
30	7.61	32.622	30	25.489	250.9	7.61	250.2	0.78	0.12	0.0	1479.
50	5.74	32.703	50	25.796	221.7	5.74	221.0	1.26	0.31	0.0	1472.
76	5.05	32.688	76	25.864	215.4	5.04	214.4	1.82	0.68	0.0	1469.
102	4.50	32.705	101	25.937	208.7	4.49	207.6	2.36	1.17	0.0	1468.
127	5.38	33.187	126	26.221	182.2	5.37	180.6	2.86	1.75	0.0	1472.
152	5.37	33.708	151	26.634	143.4	5.36	141.4	3.27	2.32	0.0	1473.
177	4.70	33.750	176	26.743	133.0	4.69	131.0	3.61	2.90	0.0	1471.
201	4.55	33.799	200	26.799	127.9	4.53	125.6	3.92	3.51	0.0	1471.
252	4.15	33.846	250	26.878	120.7	4.13	118.1	4.55	4.95	0.0	1470.
302	3.85	33.881	300	26.937	115.3	3.83	112.5	5.14	6.63	0.0	1470.
403	3.83	34.029	400	27.056	104.9	3.80	101.1	6.25	10.62	0.0	1471.
505	3.68	34.126	501	27.148	96.8	3.64	92.3	7.28	15.37	0.0	1473.
609	3.44	34.201	604	27.231	89.5	3.40	84.4	8.25	20.87	0.0	1473.



OXYGEN, ML/L
0.00
2.00
4.00
6.00
8.00
10.00
SALINITY, O/OO
30.50
31.50
32.50
33.50
34.50
35.50
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 4 - 37

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 37 DATE 20/ 6/72
POSITION 50- 0.0 N. 145- 0.0 W GMT 19.8
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	8.70	32.577	0	25.293	269.0	8.70	268.8	0.0	0.0	6.86	1482.
10	8.69	32.576	10	25.294	269.1	8.69	268.8	0.27	0.01	7.09	1483.
20	7.96	32.601	20	25.422	257.0	7.96	256.5	0.54	0.05	7.29	1480.
31	7.19	32.628	31	25.551	244.9	7.19	244.2	0.81	0.13	7.41	1477.
51	5.36	32.674	51	25.818	219.7	5.36	218.9	1.28	0.32	7.41	1470.
76	4.40	32.679	76	25.927	209.4	4.39	208.6	1.82	0.67	7.50	1467.
102	4.09	32.723	101	25.993	203.1	4.08	202.2	2.34	1.15	7.44	1466.
127	3.90	33.046*	126	26.269	177.2	3.89	176.0	2.82	1.71	7.11	1466.
152	4.40	33.436	151	26.527	153.1	4.39	151.5	3.23	2.30	5.34	1469.
177	4.49	33.679	176	26.710	136.1	4.48	134.1	3.60	2.90	4.55	1470.
202	4.52	33.787	201	26.792	128.6	4.50	126.3	3.93	3.54	3.61	1471.
253	4.36	33.860	251	26.867	121.8	4.34	119.1	4.55	5.00	2.63	1471.
302	4.15	33.917	300	26.935	115.7	4.13	112.7	5.14	6.66	1.93	1471.
403	3.90	34.024	400	27.045	105.9	3.87	102.1	6.26	10.67	1.34	1472.
504	3.71	34.099	500	27.124	99.2	3.67	94.6	7.29	15.46	1.09	1473.
608	3.50	34.191	603	27.218	90.9	3.46	85.7	8.28	21.06	0.84	1474.
801	3.17	34.300	794	27.336	80.6	3.11	74.5	9.92	32.88	0.59	1476.
1004	2.88	34.379	994	27.425	72.9	2.81	65.9	11.47	47.14	0.58	1478.
1206	2.60	34.448	1194	27.505	66.0	2.52	58.2	12.88	62.94	0.65	1480.
1512	2.31	34.515	1495	27.583	59.3	2.21	50.7	14.78	89.28	0.66	1484.
2022	1.97	34.588	1997	27.669	52.2	1.83	42.4	17.60	140.04	1.27	1491.
2534	1.75	34.632	2500	27.721	48.0	1.57	37.2	20.15	199.30	1.98	1499.
3048	1.60	34.658	3003	27.753	45.8	1.37	33.8	22.55	267.57	2.60	1507.
3562	1.54	34.678	3506	27.773	44.9	1.26	31.6	24.87	345.91	3.09	1515.
4077	1.53	34.684	4008	27.779	45.7	1.20	30.7	27.20	436.77	3.31	1524.
4181	1.52	34.686	4109	27.781	45.8	1.18	30.5	27.68	456.72	3.33	1526.
4233	1.54	34.688	4209	27.781	46.2	1.18	30.3	28.15	477.08	3.38	1528.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6.00
8.00
10.00
SALINITY, 0/00
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31.50
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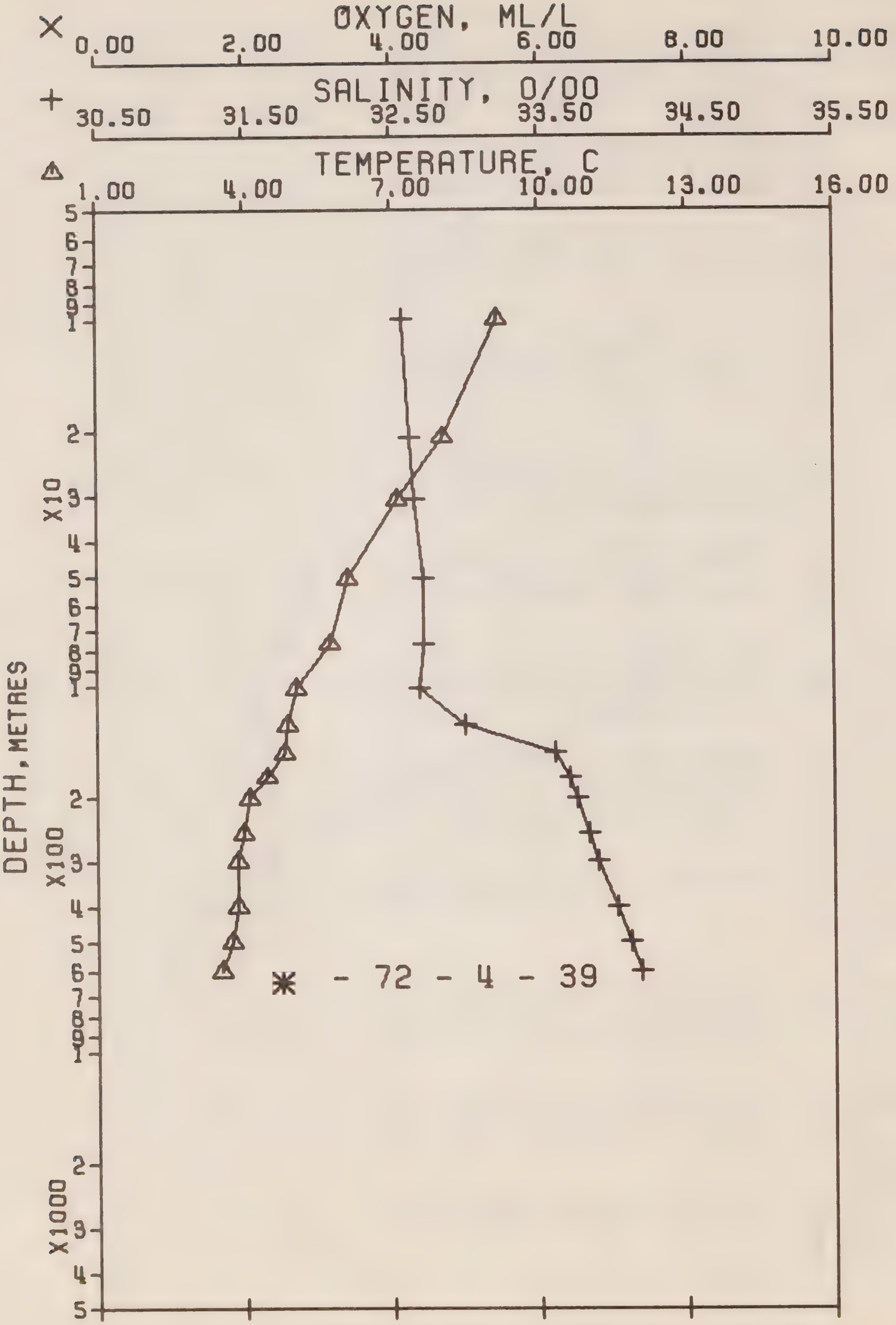
34.50
35.50
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 4 - 38

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 38 DATE 22/ 6/72
POSITION 50- 0.0 N. 145- 0.0 W GMT 20.3
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	8.78	32.575	0	25.280	270.3	8.78	270.1	0.0	0.0	7.06	1483.
10	8.73	32.576	10	25.288	269.7	8.73	269.3	0.27	0.01	7.11	1483.
20	8.60	32.583	20	25.313	267.5	8.60	266.8	0.54	0.06	7.15	1482.
30	7.28	32.619	30	25.532	246.7	7.28	246.1	0.80	0.12	7.32	1478.
51	5.02	32.670	51	25.853	216.2	5.02	215.5	1.29	0.32	7.35	1469.
76	4.51	32.670	76	25.908	211.2	4.50	210.3	1.82	0.67	7.32	1467.
102	4.14	32.721	101	25.987	203.8	4.13	202.8	2.34	1.15	7.33	1466.
127	4.09	32.826	126	26.075	195.6	4.08	194.4	2.85	1.74	7.06	1466.
153	4.19	33.362	152	26.490	156.6	4.18	154.9	3.31	2.40	5.05	1468.
178	4.44	33.683	177	26.718	135.2	4.43	133.3	3.68	3.01	4.27	1470.
203	4.32	33.735	202	26.772	130.4	4.31	128.2	4.01	3.66	3.66	1470.
255	4.29	33.827	253	26.849	123.6	4.27	120.9	4.66	5.18	2.81	1471.
305	4.27	33.908	303	26.915	117.7	4.25	114.6	5.27	6.91	2.05	1472.
407	3.92	34.002	404	27.026	107.9	3.89	104.0	6.41	11.07	1.43	1472.
509	3.71	34.070	505	27.101	101.4	3.67	96.8	7.48	16.07	0.98	1473.
610	3.51	34.189	605	27.215	91.1	3.47	85.9	8.46	21.61	0.77	1474.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4.00
6.00
8.00
10.00
SALINITY, 0/00
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31.50
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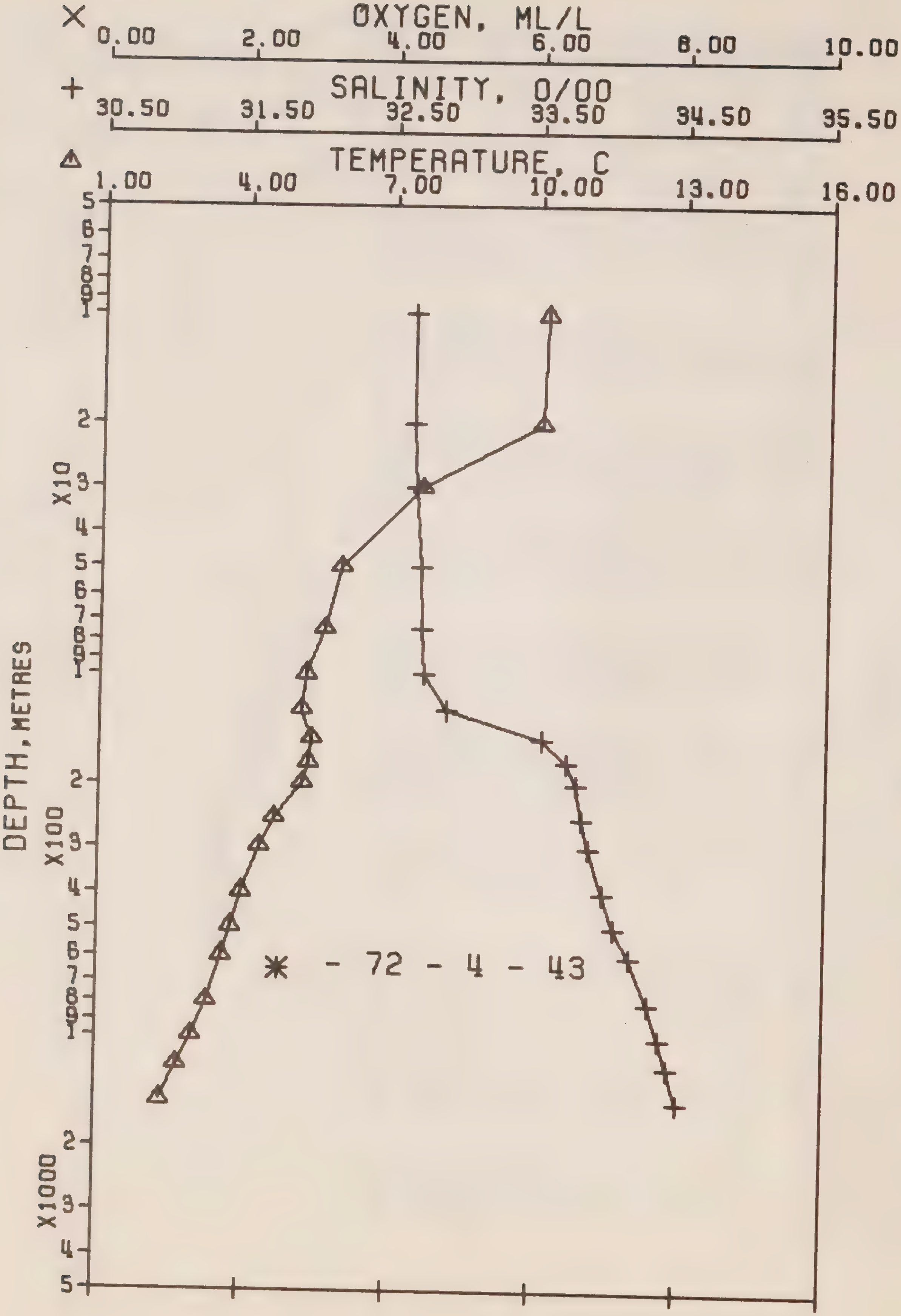
35.50
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 4 - 39

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 39 DATE 24/ 6/72
POSITION 50- 0.0 N. 145- 0.0 W GMT 19.4
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	9.19	32.586	0	25.224	275.6	9.19	275.4	0.0	0.0	0.0	1484.
10	9.17	32.583	10	25.225	275.7	9.17	275.3	0.28	0.01	0.0	1484.
21	8.06	32.628	21	25.429	256.5	8.06	255.9	0.57	0.06	0.0	1480.
31	7.11	32.663	31	25.590	241.3	7.11	240.5	0.82	0.13	0.0	1477.
51	6.09	32.721	51	25.768	224.5	6.09	223.7	1.29	0.32	0.0	1473.
77	5.75	32.725	77	25.812	220.5	5.74	219.4	1.87	0.70	0.0	1472.
103	5.04	32.692	102	25.868	215.3	5.03	214.1	2.42	1.21	0.0	1470.
129	4.88	33.003	128	26.132	190.5	4.87	189.0	2.96	1.85	0.0	1470.
154	4.80	33.612	153	26.623	144.2	4.79	142.4	3.38	2.45	0.0	1471.
179	4.45	33.713	178	26.741	133.1	4.44	131.1	3.72	3.03	0.0	1470.
204	4.10	33.765	203	26.819	125.8	4.09	123.7	4.05	3.67	0.0	1469.
255	3.98	33.836	253	26.888	119.7	3.96	117.2	4.66	5.11	0.0	1469.
304	3.85	33.898	302	26.950	114.1	3.83	111.2	5.24	6.76	0.0	1470.
404	3.84	34.027	401	27.054	105.2	3.81	101.4	6.33	10.70	0.0	1471.
505	3.73	34.119	501	27.138	97.9	3.69	93.3	7.35	15.45	0.0	1473.
607	3.51	34.193	602	27.218	90.8	3.47	85.7	8.32	20.90	0.0	1474.



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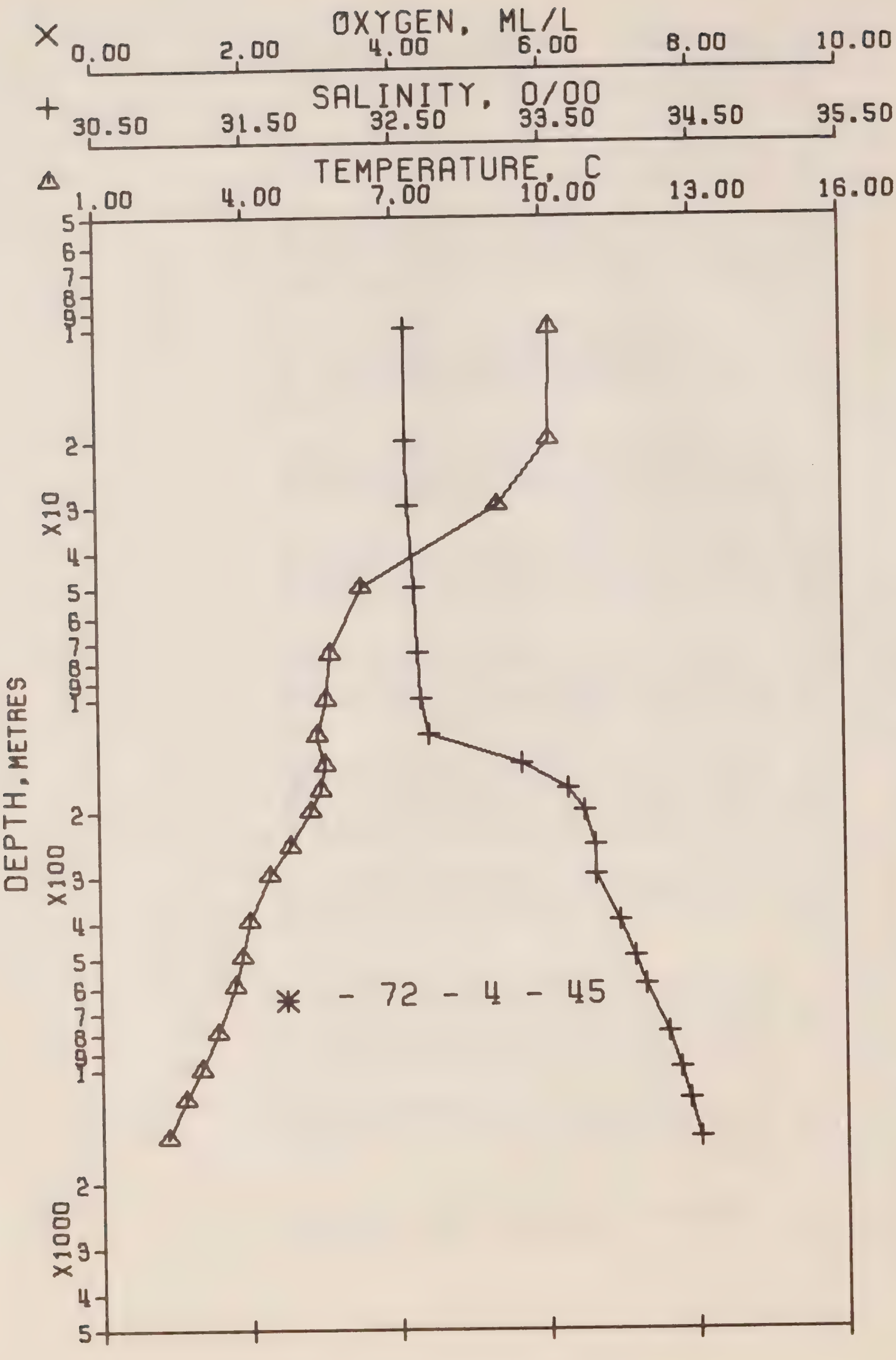
4.00
6.00
8.00
10.00
+ SALINITY, 0/00
30.50
31.50
32.50
33.50
34.50
35.50
Δ TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 4 - 43

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 43 DATE 26/ 6/72
POSITION 49-26.0 N. 136-40.0 W GMT 21.8
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	10.12	32.639	0	25.114	286.0	10.12	285.8	0.0	0.0	0.0	1488.
10	10.15	32.640	10	25.110	286.7	10.15	286.3	0.29	0.01	0.0	1488.
20	10.05	32.641	20	25.128	285.1	10.05	284.5	0.58	0.06	0.0	1488.
30	7.60	32.662	30	25.521	247.7	7.60	247.1	0.85	0.13	0.0	1479.
50	5.96	32.701	50	25.768	224.5	5.96	223.6	1.31	0.32	0.0	1473.
74	5.62	32.714	74	25.819	219.8	5.61	218.8	1.84	0.66	0.0	1472.
100	5.25	32.731	99	25.875	214.6	5.24	213.4	2.39	1.15	0.0	1471.
125	5.16	32.894	124	26.015	201.6	5.15	200.1	2.92	1.75	0.0	1471.
150	5.38	33.550	149	26.508	155.3	5.37	153.3	3.37	2.38	0.0	1473.
175	5.31	33.723	174	26.653	141.8	5.30	139.5	3.74	2.99	0.0	1473.
200	5.21	33.794	199	26.720	135.6	5.19	133.0	4.09	3.66	0.0	1474.
250	4.62	33.826	248	26.812	127.2	4.60	124.4	4.74	5.14	0.0	1472.
300	4.34	33.885	298	26.889	120.2	4.32	117.0	5.36	6.89	0.0	1472.
401	3.96	33.984	398	27.007	109.6	3.93	105.7	6.51	11.01	0.0	1472.
501	3.76	34.063	497	27.090	102.4	3.72	97.9	7.57	15.88	0.0	1473.
602	3.59	34.168	597	27.191	93.5	3.55	88.3	8.56	21.44	0.0	1474.
804	3.28	34.298	797	27.324	81.9	3.22	75.5	10.32	34.06	0.0	1476.
1007	2.97	34.378	997	27.416	74.0	2.90	66.7	11.89	48.57	0.0	1478.
1209	2.69	34.442	1197	27.492	67.4	2.61	59.4	13.32	64.70	0.0	1480.
1517	2.34	34.509	1500	27.576	60.1	2.24	51.4	15.27	91.76	0.0	1484.



X OXYGEN, ML/L
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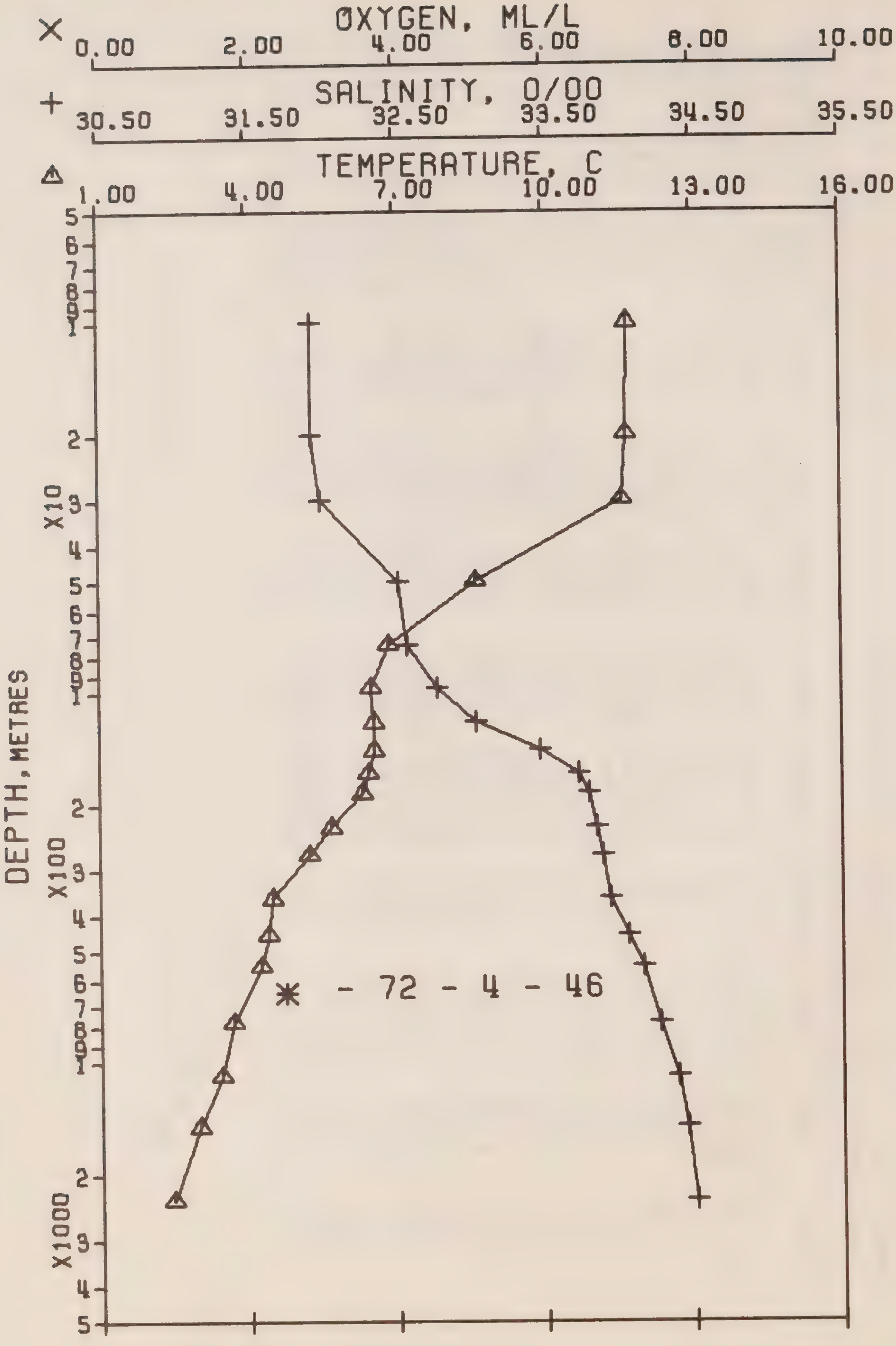
+ SALINITY, O/OO
30.50 31.50 32.50 33.50 34.50 35.50
TEMPERATURE, C
1.00 4.00 7.00 10.00 13.00 16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 4 - 45

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 45 DATE 27/ 6/72
POSITION 49-10.0 N. 132-40.0 W GMT 7.8
HYDROGRAPHIC CAST CATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	10.11	32.572	0	25.064	290.8	10.11	290.6	0.0	0.0	0.0	1488.
10	10.14	32.576	10	25.062	291.2	10.14	290.8	0.29	0.02	0.0	1488.
20	10.12	32.577	20	25.066	291.0	10.12	290.3	0.59	0.06	0.0	1488.
30	9.08	32.592	30	25.246	274.0	9.08	273.2	0.87	0.13	0.0	1484.
50	6.32	32.630	50	25.667	234.1	6.32	233.2	1.38	0.34	0.0	1474.
75	5.68	32.647	75	25.759	225.5	5.67	224.4	1.95	0.71	0.0	1472.
101	5.59	32.672	100	25.789	222.9	5.58	221.5	2.51	1.21	0.0	1472.
126	5.42	32.716	125	25.844	217.9	5.41	216.3	3.08	1.86	0.0	1472.
151	5.56	33.339	150	26.320	173.1	5.55	171.1	3.57	2.56	0.0	1474.
176	5.46	33.653	175	26.580	148.8	5.45	146.4	3.97	3.23	0.0	1474.
201	5.26	33.759	200	26.687	138.8	5.24	136.2	4.33	3.92	0.0	1474.
251	4.85	33.828	249	26.788	129.6	4.83	126.6	4.99	5.43	0.0	1473.
300	4.43	33.830	298	26.836	125.3	4.41	122.0	5.62	7.20	0.0	1472.
399	4.01	33.989	396	27.006	109.7	3.98	105.8	6.78	11.34	0.0	1472.
498	3.85	34.095	494	27.107	100.9	3.81	96.2	7.82	16.08	0.0	1473.
597	3.70	34.162	592	27.175	95.1	3.66	89.7	8.78	21.49	0.0	1474.
796	3.34	34.314	789	27.331	81.4	3.28	74.8	10.54	33.91	0.0	1476.
1000	3.00	34.390	990	27.423	73.4	2.93	66.1	12.10	48.24	0.0	1478.
1208	2.68	34.451	1196	27.500	66.6	2.60	58.6	13.56	64.63	0.0	1480.
1537	2.33	34.522	1520	27.587	59.2	2.23	50.3	15.62	93.35	0.0	1484.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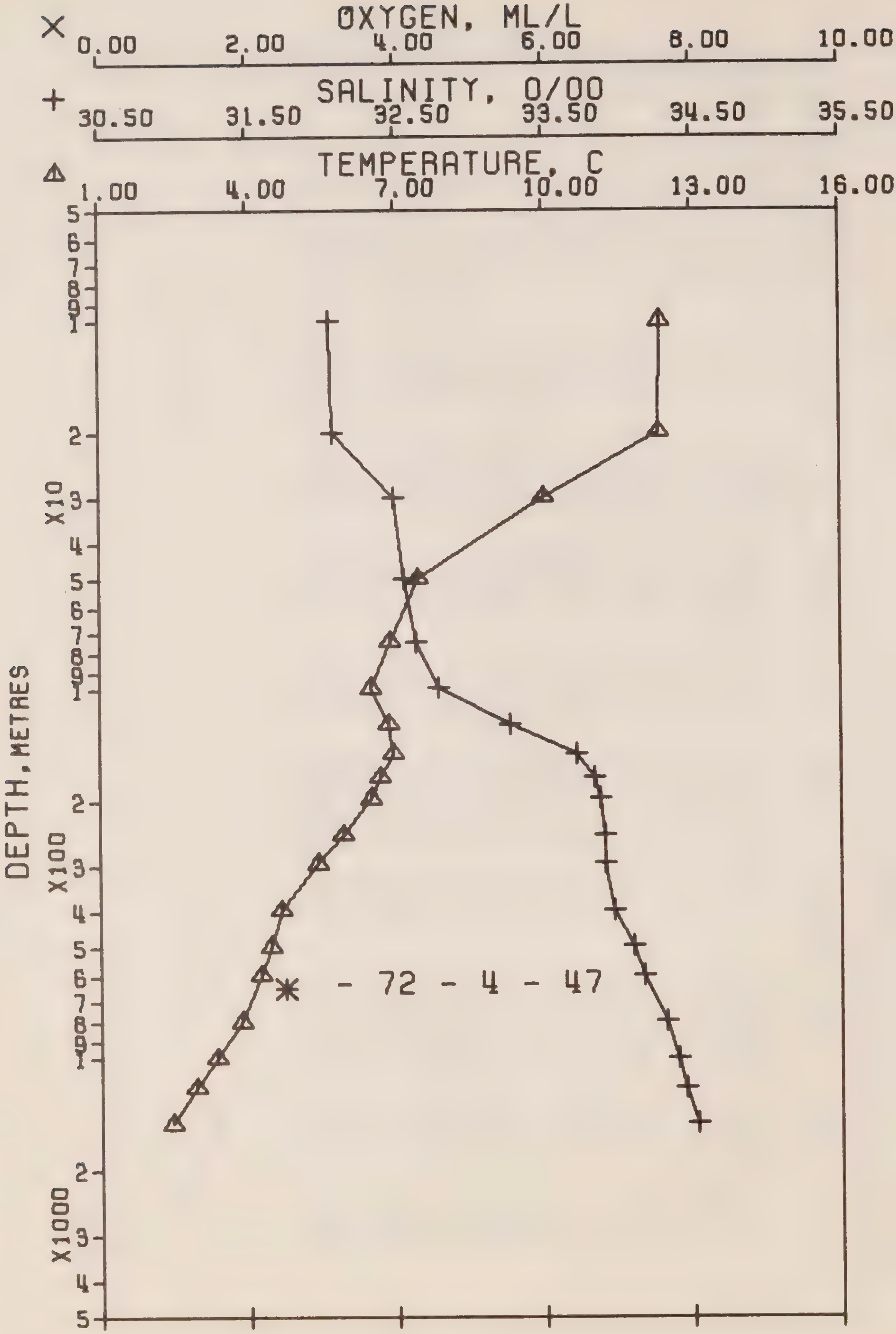
0.00 2.00 4.00 6.00 8.00 10.00
+ SALINITY, 0/00
30.50 31.50 32.50 33.50 34.50 35.50
Δ TEMPERATURE, C
1.00 4.00 7.00 10.00 13.00 16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 4 - 46

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 46 DATE 27/ 6/72
POSITION 49- 2.0 N. 130-40.0 W GMT 14.2
HYDROGRAPHIC CAST CATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	11.69	31.945	0	24.301	363.5	11.69	363.3	0.0	0.0	0.0	1493.
10	11.70	31.941	10	24.296	364.2	11.70	363.7	0.37	0.02	0.0	1493.
20	11.69	31.945	20	24.301	363.9	11.69	363.3	0.73	0.08	0.0	1493.
30	11.58	31.997	30	24.361	358.4	11.58	357.5	1.10	0.17	0.0	1493.
50	8.62	32.522	50	25.263	272.8	8.61	271.7	1.74	0.43	0.0	1483.
74	6.84	32.579	74	25.560	244.6	6.83	243.4	2.35	0.82	0.0	1476.
98	6.50	32.785	97	25.766	225.3	6.49	223.7	2.89	1.29	0.0	1476.
121	6.55	33.043	120	25.963	207.0	6.54	205.0	3.39	1.85	0.0	1477.
144	6.56	33.471	143	26.298	175.5	6.55	173.1	3.84	2.45	0.0	1478.
166	6.42	33.730	165	26.521	154.7	6.41	152.0	4.20	3.02	0.0	1478.
188	6.32	33.798	187	26.587	148.6	6.30	145.7	4.53	3.63	0.0	1478.
233	5.69	33.847	231	26.705	137.7	5.67	134.5	5.17	4.99	0.0	1476.
276	5.24	33.888	274	26.791	129.8	5.22	126.3	5.75	6.49	0.0	1475.
363	4.47	33.941	360	26.920	118.0	4.44	114.0	6.82	9.97	0.0	1473.
454	4.38	34.058	450	27.022	109.1	4.35	104.3	7.84	14.25	0.0	1475.
551	4.25	34.163	547	27.119	100.7	4.21	95.0	8.87	19.51	0.0	1476.
784	3.67	34.271	777	27.265	88.1	3.61	81.1	11.04	34.30	0.0	1477.
1091	3.43	34.392	1080	27.384	78.7	3.35	69.6	13.58	58.53	0.0	1482.
1502	2.99	34.450	1486	27.472	72.0	2.88	61.1	16.66	99.24	0.0	1487.
2379	2.45	34.510	2348	27.567	65.5	2.27	51.6	22.62	217.12	0.0	1499.


OXYGEN, ML/L
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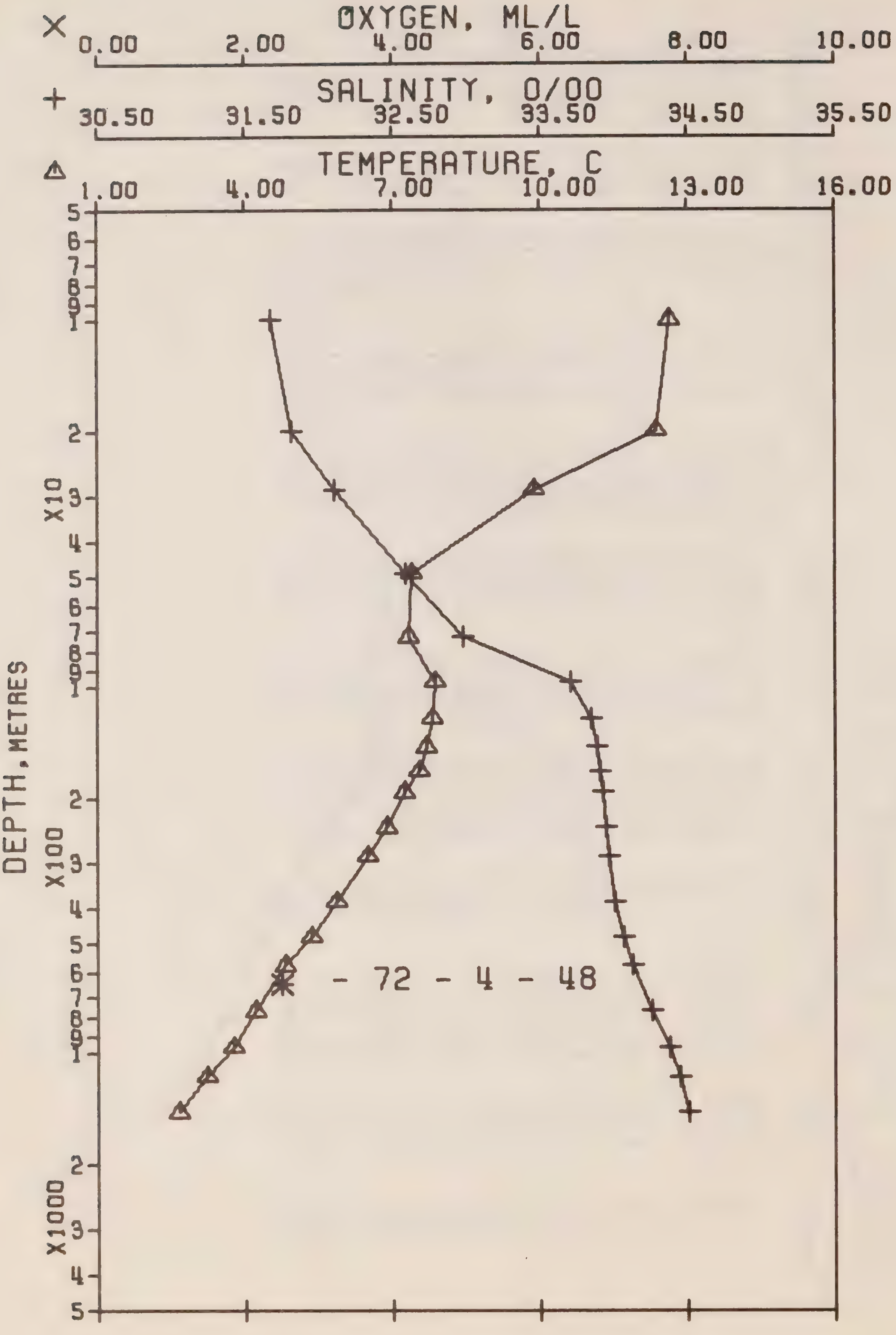
2.00
4.00
6.00
8.00
10.00
SALINITY, O/OO
30.50
31.50
32.50
33.50
34.50
35.50
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 4 - 47

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 47 DATE 27/ 6/72
POSITION 48-51.0 N. 128-40.0 W GMT 20.1
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	12.41	32.044	0	24.244	369.0	12.41	368.7	0.0	0.0	0.0	1495.
10	12.37	32.065	10	24.267	366.9	12.37	366.5	0.37	0.02	0.0	1495.
20	12.35	32.082	20	24.284	365.6	12.35	364.8	0.74	0.08	0.0	1495.
30	9.99	32.493	30	25.022	295.4	9.99	294.5	1.08	0.16	0.0	1488.
50	7.44	32.560	50	25.464	253.5	7.44	252.5	1.61	0.38	0.0	1478.
74	6.87	32.637	74	25.601	240.6	6.86	239.4	2.20	0.76	0.0	1477.
100	6.49	32.786	99	25.768	225.0	6.48	223.5	2.79	1.28	0.0	1476.
125	6.84	33.273	124	26.105	193.5	6.83	191.4	3.32	1.89	0.0	1478.
150	6.94	33.721	149	26.444	161.9	6.93	159.3	3.76	2.51	0.0	1480.
174	6.67	33.838	173	26.573	149.9	6.65	147.1	4.14	3.12	0.0	1479.
199	6.48	33.876	198	26.628	145.0	6.46	141.8	4.51	3.83	0.0	1479.
250	5.92	33.906	248	26.723	136.3	5.90	132.7	5.21	5.45	0.0	1477.
299	5.41	33.915	297	26.792	130.1	5.39	126.1	5.87	7.29	0.0	1476.
399	4.66	33.975	396	26.926	118.0	4.63	113.4	7.11	11.69	0.0	1475.
500	4.46	34.098	496	27.045	107.4	4.42	102.0	8.24	16.89	0.0	1476.
600	4.24	34.173	595	27.128	100.3	4.19	94.1	9.28	22.70	0.0	1477.
801	3.85	34.320	794	27.286	86.7	3.79	79.1	11.15	36.07	0.0	1478.
1004	3.35	34.397	995	27.396	76.9	3.28	68.5	12.81	51.32	0.0	1480.
1208	2.91	34.452	1196	27.481	69.1	2.83	60.5	14.29	68.03	0.0	1481.
1517	2.44	34.528	1501	27.582	59.8	2.34	50.7	16.28	95.57	0.0	1485.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+ SALINITY, 0/00
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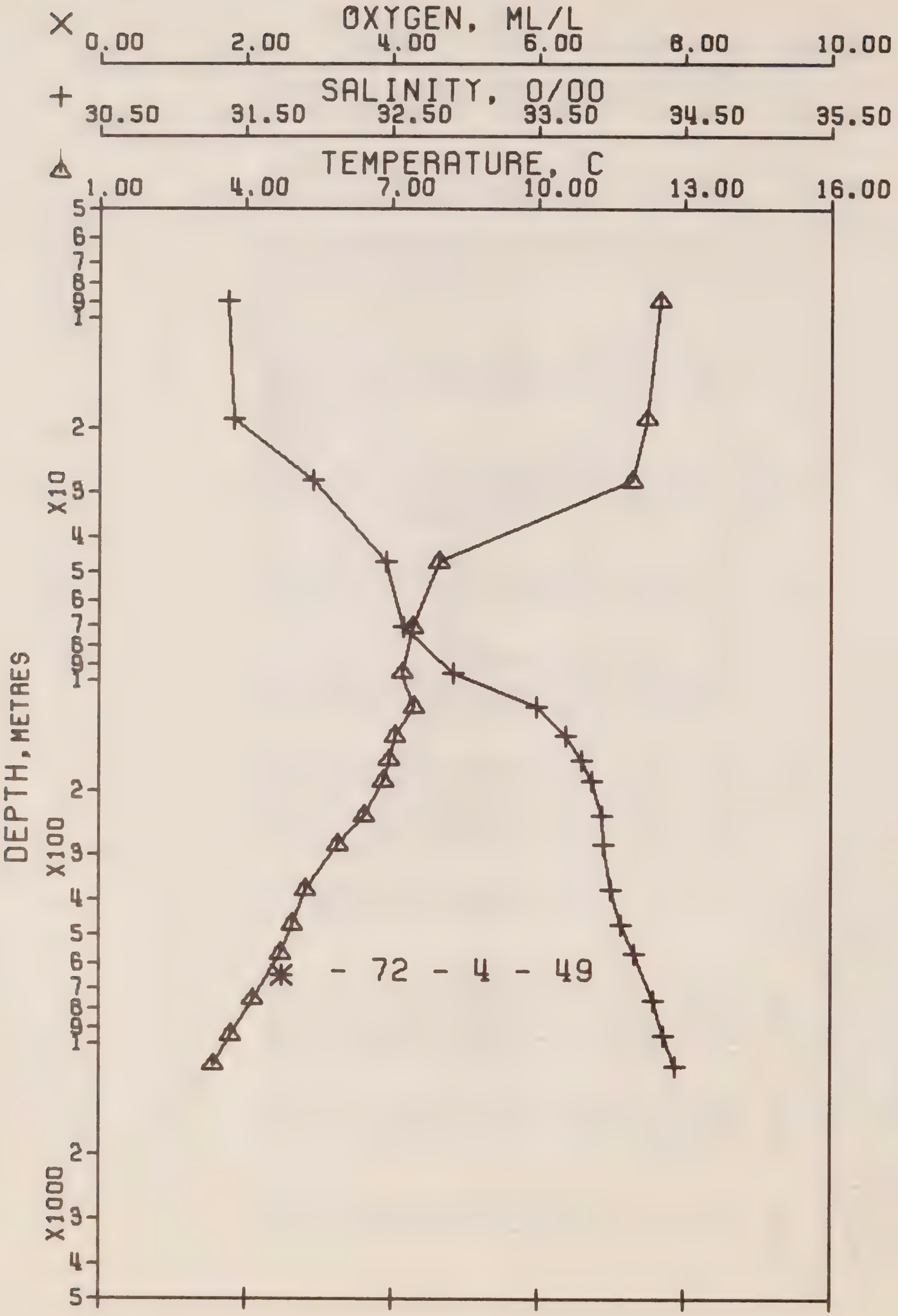
△ TEMPERATURE, C
1.00 4.00 7.00 10.00 13.00 16.00
DEPTH, METRES
X10
X100
X1000
- 72 - 4 - 48

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 48 DATE 27/ 6/72
POSITION 48-46.0 N. 127-40.0 W GMT 23.7
HYDROGRAPHIC CAST CATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	12.62	31.684	0	23.925	399.3	12.62	399.1	0.0	0.0	0.0	1495.
10	12.65	31.684	10	23.920	400.1	12.65	399.7	0.40	0.02	0.0	1496.
20	12.38	31.816	20	24.073	385.7	12.38	385.0	0.80	0.08	0.0	1495.
29	9.89	32.110	29	24.741	322.1	9.89	321.3	1.12	0.16	0.0	1487.
49	7.39	32.591	49	25.495	250.5	7.39	249.5	1.68	0.39	0.0	1478.
73	7.33	32.585	73	25.812	220.7	7.32	219.3	2.24	0.74	0.0	1479.
98	7.87	33.715	97	26.308	174.1	7.86	172.2	2.72	1.15	0.0	1482.
123	7.80	33.850	122	26.424	163.6	7.79	161.2	3.14	1.62	0.0	1483.
147	7.68	33.890	146	26.473	159.3	7.67	156.5	3.53	2.16	0.0	1483.
171	7.53	33.913	170	26.513	155.9	7.51	152.7	3.91	2.78	0.0	1482.
195	7.24	33.932	194	26.569	150.8	7.22	147.3	4.28	3.47	0.0	1482.
244	6.89	33.953	242	26.634	145.3	6.87	141.2	4.99	5.07	0.0	1481.
292	6.49	33.973	290	26.703	139.2	6.46	134.6	5.68	6.95	0.0	1480.
389	5.85	34.015	386	26.818	129.1	5.82	123.5	6.98	11.45	0.0	1480.
485	5.35	34.066	481	26.919	120.2	5.31	114.0	8.17	16.78	0.0	1479.
581	4.81	34.134	576	27.035	109.7	4.76	102.9	9.28	22.76	0.0	1479.
774	4.22	34.260	767	27.200	95.2	4.16	87.2	11.24	36.34	0.0	1479.
967	3.75	34.379	958	27.343	82.5	3.68	73.6	12.95	51.51	0.0	1481.
1162	3.23	34.447	1151	27.447	72.9	3.15	63.6	14.46	67.91	0.0	1482.
1461	2.66	34.510	1445	27.549	53.4	2.56	53.9	16.48	94.84	0.0	1485.



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+ SALINITY, 0/00
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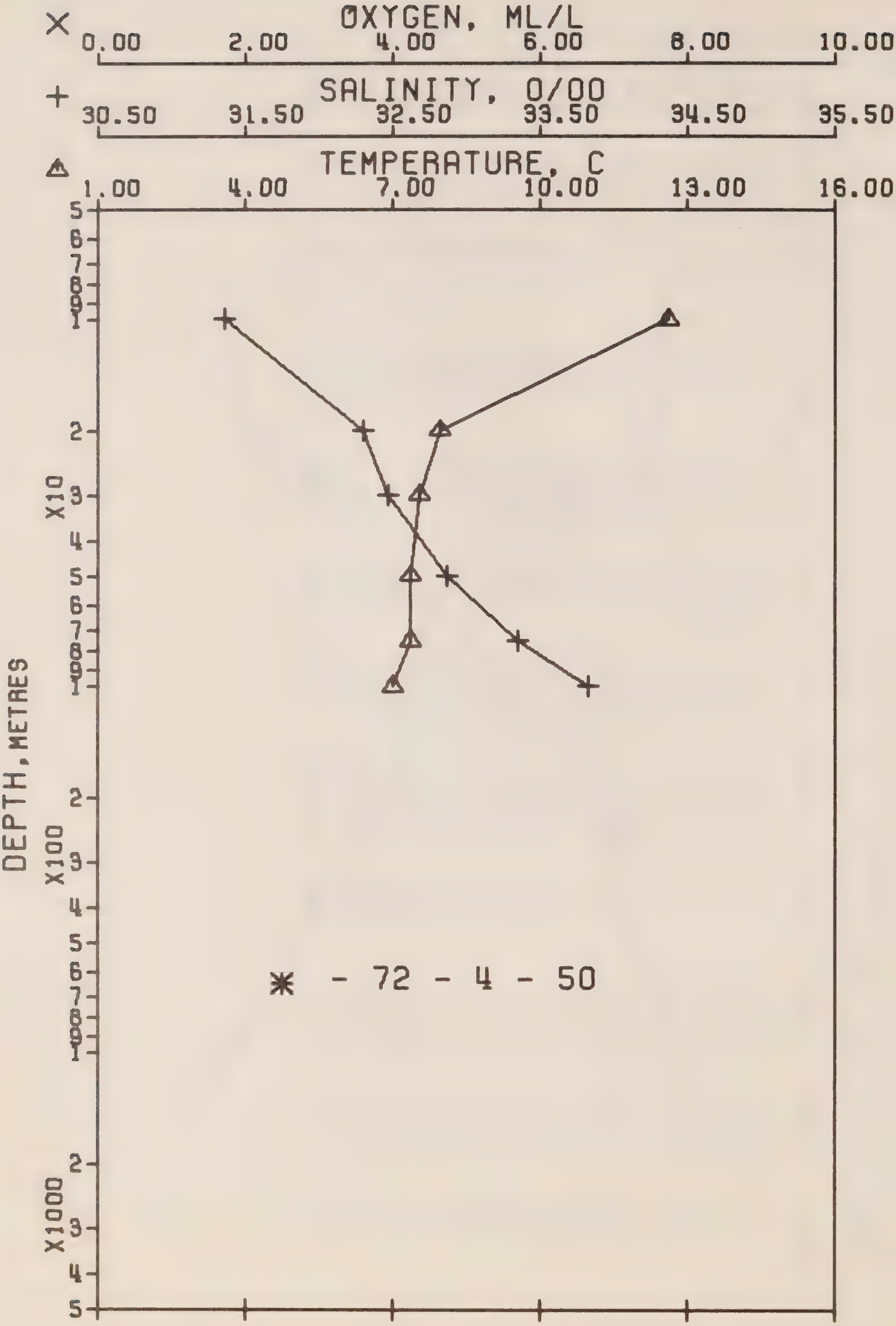
TEMPERATURE, C
1.00 4.00 7.00 10.00 13.00 16.00
DEPTH, METRES
X10
X100
X1000
- 72 - 4 - 49

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 49 DATE 28/ 6/72
POSITION 48-42.0 N. 126-40.0 W GMT 3.1
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	12.67	31.374	0	23.677	423.1	12.67	422.9	0.0	0.0	0.0	1495.
9	12.50	31.377	9	23.711	420.0	12.50	419.5	0.38	0.02	0.0	1495.
19	12.21	31.424	19	23.802	411.5	12.21	410.8	0.80	0.08	0.0	1494.
28	11.93	31.956	28	24.265	367.5	11.93	366.6	1.16	0.16	0.0	1494.
47	7.96	32.458	47	25.310	268.1	7.96	267.1	1.75	0.39	0.0	1480.
71	7.43	32.581	71	25.482	252.1	7.42	250.8	2.37	0.77	0.0	1479.
96	7.20	32.919	95	25.779	224.2	7.19	222.5	2.95	1.26	0.0	1479.
119	7.46	33.492	118	26.192	185.4	7.45	183.2	3.42	1.77	0.0	1481.
143	7.07	33.686	142	26.399	166.0	7.06	163.5	3.84	2.33	0.0	1480.
166	6.94	33.797	165	26.504	156.4	6.92	153.6	4.21	2.92	0.0	1480.
190	6.81	33.875	189	26.583	149.2	6.79	146.1	4.58	3.59	0.0	1480.
238	6.44	33.942	236	26.685	140.1	6.42	136.3	5.26	5.08	0.0	1479.
285	5.88	33.946	283	26.760	133.3	5.66	129.2	5.91	6.80	0.0	1478.
380	5.22	33.996	377	26.879	122.7	5.19	117.8	7.12	10.90	0.0	1477.
474	4.95	34.071	470	26.969	114.9	4.91	109.2	8.23	15.75	0.0	1477.
570	4.72	34.161	565	27.067	106.5	4.67	99.9	9.29	21.39	0.0	1478.
761	4.15	34.286	754	27.228	92.3	4.09	84.6	11.18	34.18	0.0	1479.
955	3.69	34.356	946	27.330	83.4	3.62	74.7	12.88	49.05	0.0	1480.
1153	3.33	34.437	1142	27.430	74.7	3.25	65.2	14.45	65.86	0.0	1482.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6.00
8.00
10.00
SALINITY, 0/00
30.50
31.50
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33.50
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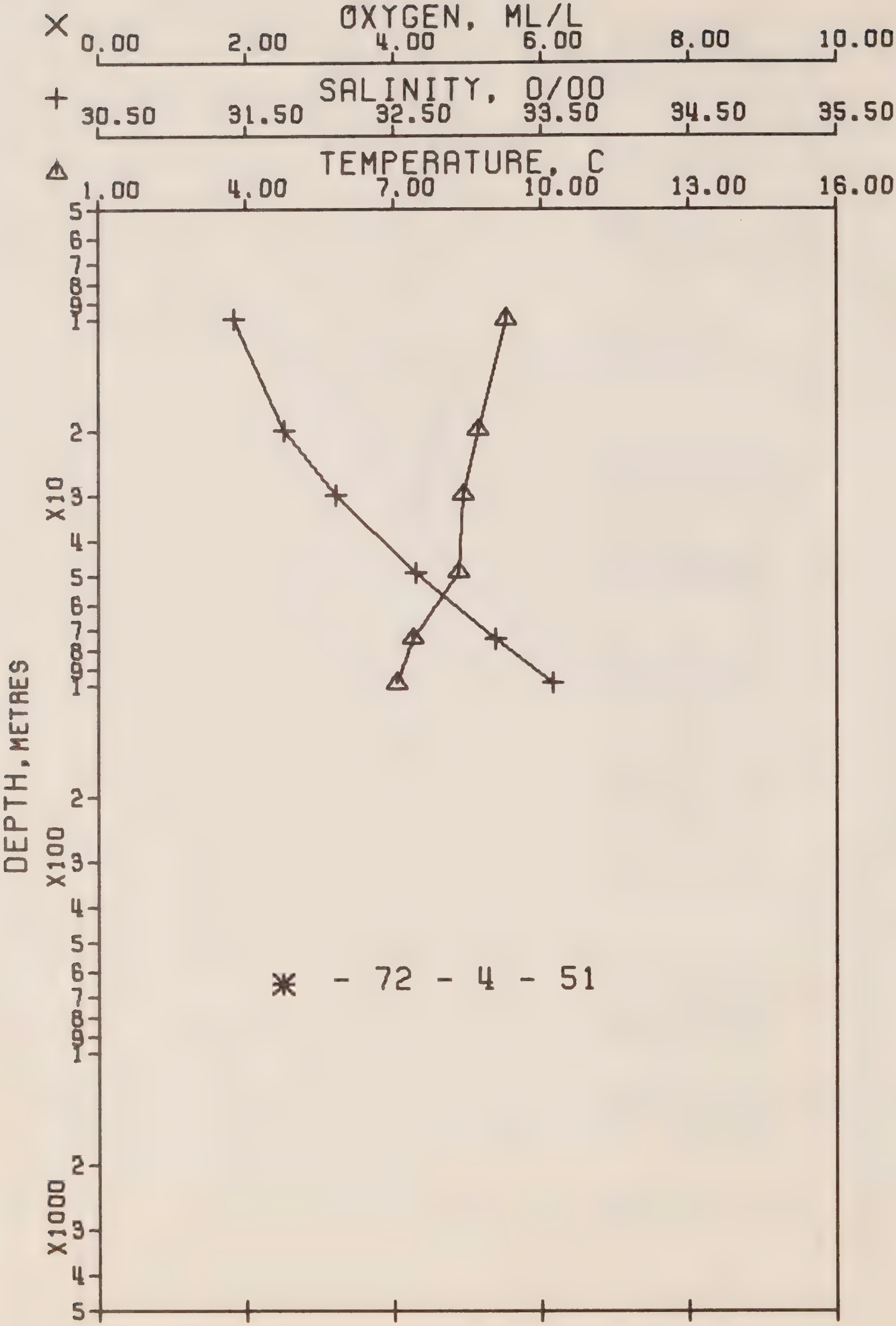
35.50
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 4 - 50

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 50 DATE 28/ 6/72
POSITION 48-38.0 N, 126- 0.0 W GMT 5.6
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	12.95	31.341	0	23.597	430.6	12.95	430.4	0.0	0.0	0.0	1496.
10	12.62	31.362	10	23.677	423.3	12.62	422.8	0.43	0.02	0.0	1495.
20	7.96	32.304	20	25.190	279.2	7.96	278.6	0.79	0.07	0.0	1480.
30	7.54	32.466	30	25.376	261.6	7.54	260.9	1.05	0.14	0.0	1478.
50	7.35	32.873	50	25.722	229.0	7.35	228.0	1.54	0.35	0.0	1478.
75	7.37	33.355	75	26.097	193.7	7.36	192.2	2.08	0.69	0.0	1480.
101	6.99	33.835	100	26.527	153.3	6.98	151.4	2.51	1.08	0.0	1479.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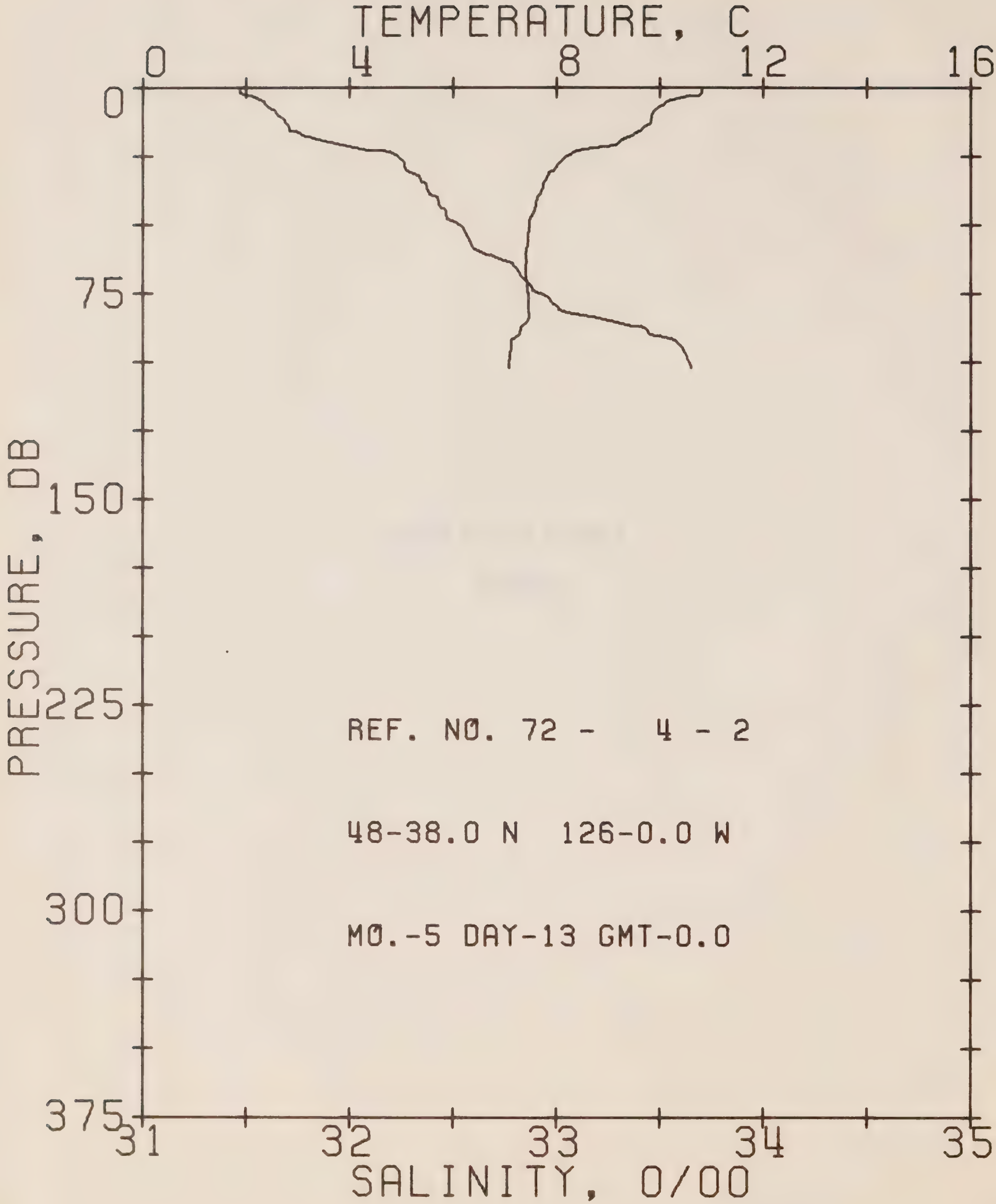
4.00
6.00
8.00
10.00
SALINITY, 0/00
30.50
31.50
32.50
33.50
34.50
35.50
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 4 - 51

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 51 DATE 28/ 6/72
POSITION 48-33.0 N. 125-33.0 W GMT 7.5
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	9.84	30.528	0	23.518	438.2	9.84	438.0	0.0	0.0	0.0	1484.
10	9.29	31.422	10	24.301	363.7	9.29	363.3	0.40	0.02	0.0	1483.
20	8.72	31.761	20	24.653	330.3	8.72	329.8	0.75	0.07	0.0	1482.
30	8.40	32.113	30	24.976	299.7	8.40	299.0	1.06	0.15	0.0	1481.
49	8.31	32.649	49	25.408	258.9	8.30	257.8	1.59	0.37	0.0	1482.
74	7.39	33.195	74	25.969	205.9	7.38	204.5	2.18	0.73	0.0	1479.
99	7.06	33.576	98	26.314	173.4	7.05	171.7	2.63	1.13	0.0	1479.

RESULTS OF STD CASTS

(P-72-4)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12
16
PRESSURE, DB
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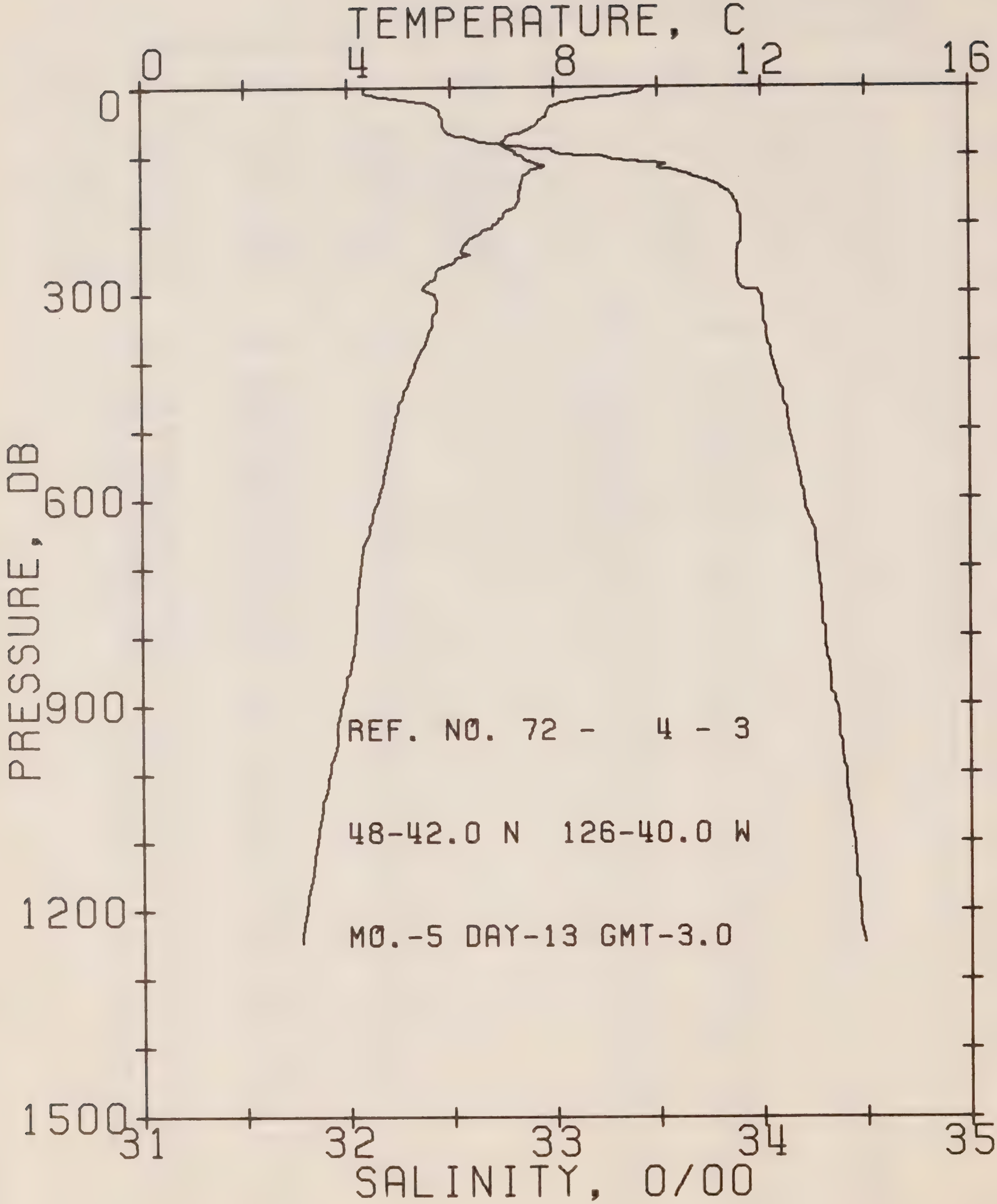
150
225
300
375
REF. NØ. 72 - 4 - 2
48-38.0 N 126-0.0 W
MØ.-5 DAY-13 GMT-0.0
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 2 DATE 13/ 5/72
POSITION 48-38.0N, 126- 0.0W GMT 0.0
RESULTS OF STP CAST 74 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	10.80	31.46	0	24.08	384.1	0.0	0.0	1489.
10	9.85	31.65	10	24.39	355.3	0.37	0.02	1486.
20	9.19	31.90	20	24.69	326.9	0.71	0.07	1484.
30	7.95	32.27	30	25.16	281.7	1.01	0.15	1480.
50	7.46	32.52	50	25.43	256.4	1.55	0.36	1478.
75	7.42	32.91	75	25.74	227.2	2.15	0.75	1479.
100	7.08	33.63	99	26.36	169.4	2.64	1.18	1479.

DEPTH	TEMP	SAL
0.	10.80	31.46
2.	10.80	31.47
3.	10.74	31.50
3.	10.54	31.52
5.	10.14	31.58
6.	10.08	31.59
7.	9.98	31.60
8.	9.93	31.63
10.	9.85	31.65
11.	9.83	31.67
12.	9.81	31.68
13.	9.80	31.69
14.	9.70	31.70
16.	9.60	31.71
16.	9.58	31.74
17.	9.48	31.76
18.	9.42	31.78
18.	9.38	31.79
18.	9.39	31.80
19.	9.25	31.84
21.	9.14	31.96
22.	8.69	32.02
23.	8.37	32.09
23.	8.37	32.16
24.	8.29	32.21
25.	8.20	32.23
27.	8.08	32.25
28.	8.03	32.26
29.	8.00	32.26
30.	7.95	32.27
31.	7.85	32.29
32.	7.84	32.33
34.	7.79	32.34
35.	7.74	32.37
37.	7.73	32.37
39.	7.69	32.38
40.	7.62	32.42
43.	7.60	32.43
45.	7.56	32.46
47.	7.51	32.46
48.	7.48	32.47
49.	7.46	32.51
51.	7.46	32.54
55.	7.43	32.57
57.	7.43	32.58
58.	7.43	32.59
59.	7.42	32.60
61.	7.40	32.66
61.	7.39	32.68
62.	7.39	32.70
64.	7.41	32.78
65.	7.40	32.79
66.	7.40	32.80
69.	7.40	32.83
72.	7.41	32.87
74.	7.42	32.88
76.	7.43	32.95
77.	7.44	32.96
78.	7.44	32.97
80.	7.44	33.00
81.	7.44	33.01
82.	7.45	33.05
83.	7.47	33.13
84.	7.46	33.20
85.	7.43	33.25
87.	7.33	33.37
87.	7.33	33.41
88.	7.31	33.43
90.	7.27	33.45
91.	7.20	33.52
92.	7.13	33.57
95.	7.11	33.61
101.	7.08	33.64
102.	7.08	33.65


TEMPERATURE, C
0
4
8
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16
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300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 4 - 3
48-42.0 N 126-40.0 W
MO.-5 DAY-13 GMT-3.0
31
32
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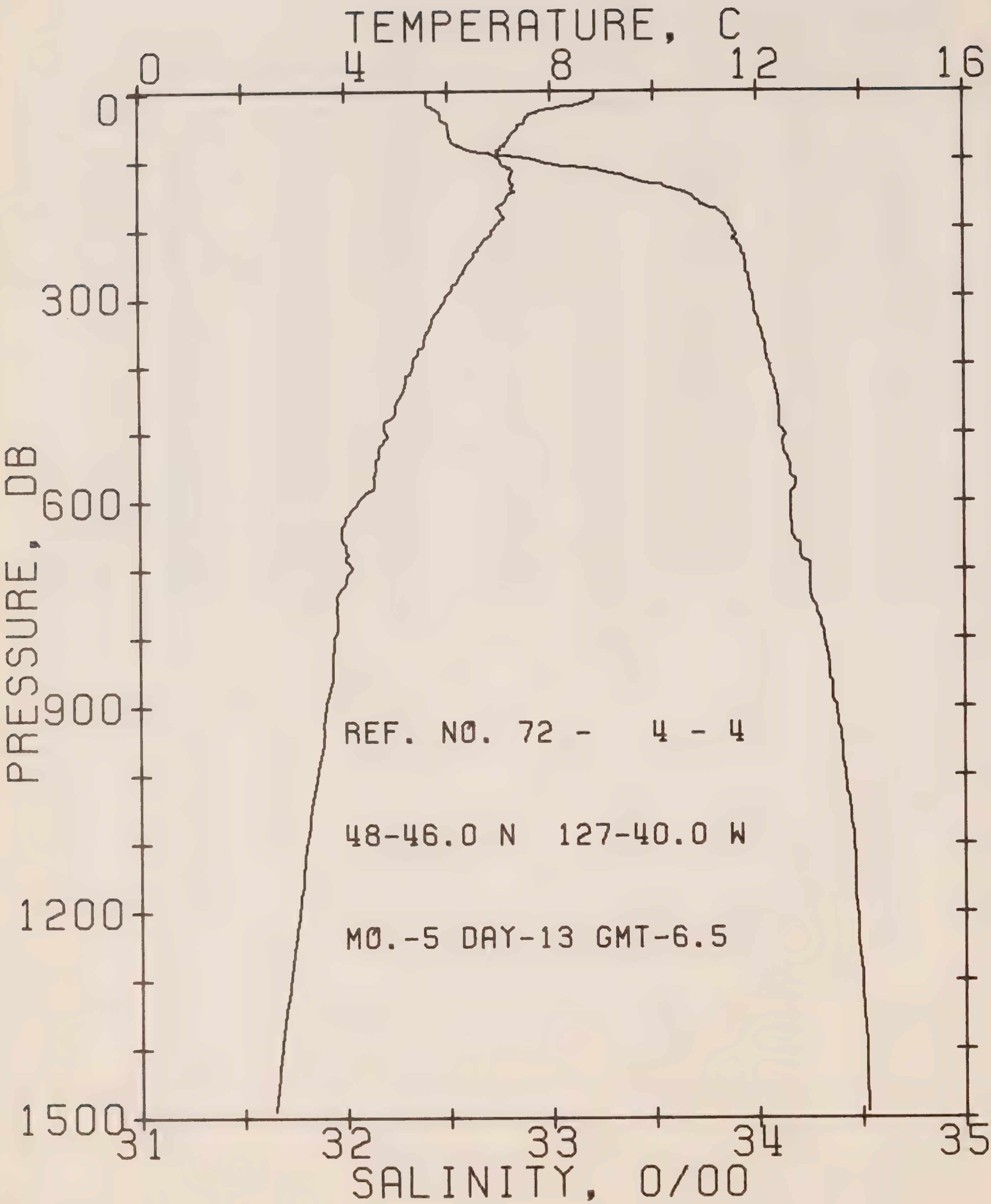
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 3 DATE 13/ 5/72
POSITION 48-42.0N, 126-40.0W GMT 3.0
RESULTS OF STP CAST 266 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	9.73	32.09	0	24.75	320.4	0.0	0.0	1486.
10	9.41	32.11	10	24.82	314.4	0.32	0.02	1485.
20	8.39	32.29	20	25.12	285.9	0.62	0.06	1481.
30	7.90	32.43	30	25.30	269.1	0.90	0.13	1480.
50	7.69	32.46	50	25.35	264.3	1.43	0.35	1479.
75	7.03	32.60	75	25.55	245.5	2.08	0.76	1477.
100	7.31	33.11	99	25.91	211.5	2.65	1.27	1479.
125	7.50	33.62	124	26.28	176.7	3.13	1.82	1481.
150	7.34	33.83	149	26.47	159.1	3.55	2.40	1481.
175	7.22	33.89	174	26.54	153.4	3.94	3.05	1481.
200	6.86	33.90	199	26.60	148.2	4.31	3.77	1480.
225	6.33	33.90	223	26.67	141.6	4.67	4.55	1479.
250	6.09	33.88	248	26.68	140.4	5.03	5.41	1478.
300	5.59	33.99	298	26.83	126.9	5.70	7.30	1477.
400	5.29	34.05	397	26.91	119.7	6.95	11.75	1477.
500	4.85	34.13	496	27.03	109.5	8.09	16.97	1477.
600	4.56	34.20	595	27.12	102.0	9.15	22.89	1478.
800	4.11	34.30	793	27.24	91.1	11.05	36.40	1479.
1000	3.61	34.40	991	27.37	79.6	12.76	52.04	1481.
1200	3.16	34.47	1188	27.47	70.6	14.25	68.80	1482.


TEMPERATURE, C
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PRESSURE, DB
REF. NO. 72 - 4 - 4
48-46.0 N 127-40.0 W
MO.-5 DAY-13 GMT-6.5
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32
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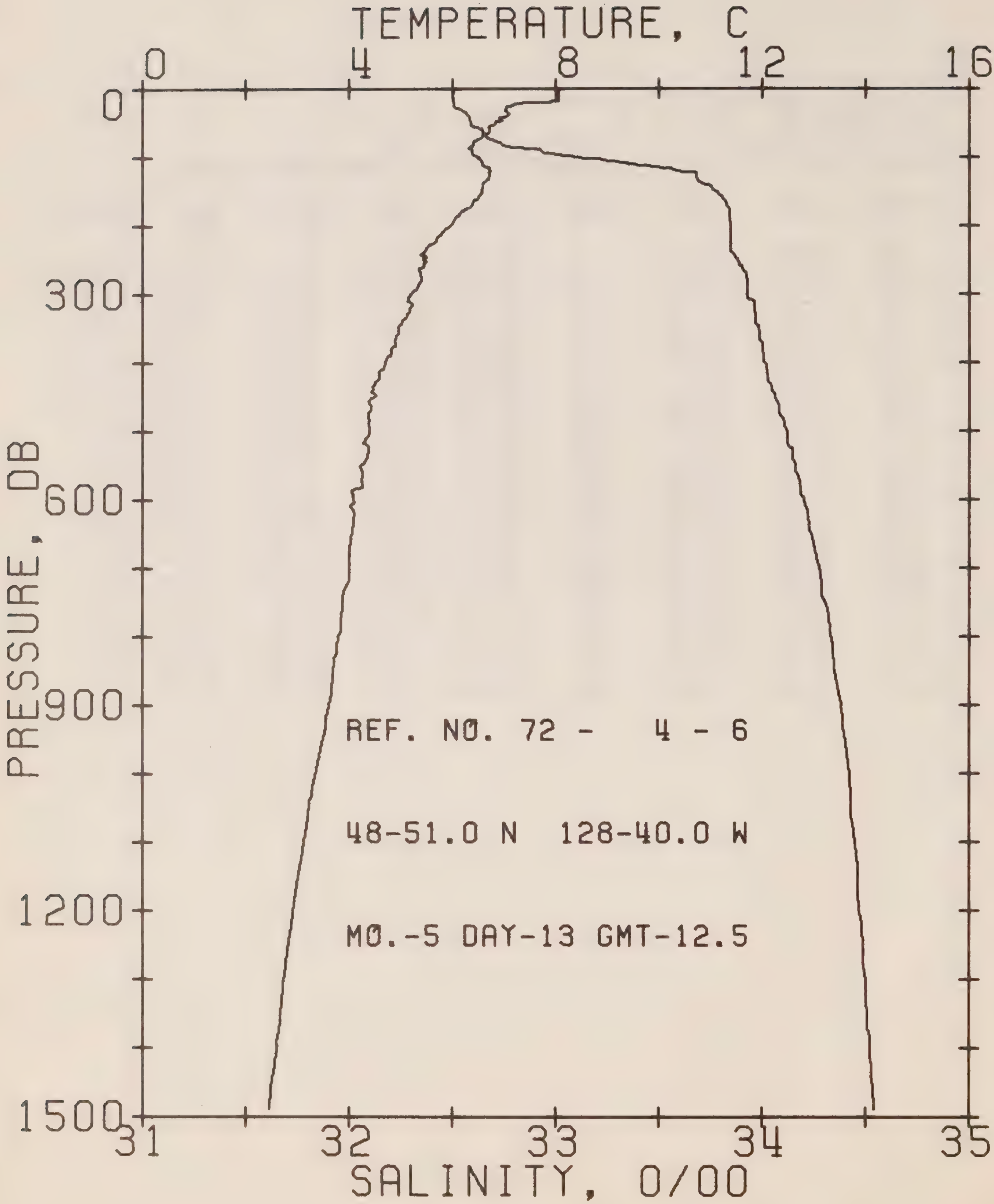
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 4 DATE 13/ 5/72
POSITION 48-46.0N, 127-40.0W GMT 6.5
RESULTS OF STP CAST 276 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	8.86	32.40	0	25.13	284.3	0.0	0.0	1483.
10	8.85	32.40	10	25.13	284.6	0.28	0.01	1483.
20	8.51	32.40	20	25.18	279.7	0.57	0.06	1482.
30	7.77	32.46	30	25.34	265.3	0.84	0.13	1479.
50	7.39	32.50	50	25.42	257.3	1.36	0.34	1478.
75	7.14	32.52	75	25.48	252.6	2.00	0.75	1478.
100	7.00	32.90	99	25.79	222.7	2.60	1.28	1478.
125	7.22	33.36	124	26.12	192.1	3.12	1.87	1480.
150	7.26	33.66	149	26.35	170.6	3.57	2.51	1481.
175	7.01	33.81	174	26.51	156.3	3.98	3.18	1480.
200	6.91	33.88	199	26.57	150.5	4.37	3.92	1480.
225	6.62	33.91	223	26.64	144.6	4.73	4.72	1480.
250	6.41	33.94	248	26.69	139.9	5.09	5.58	1479.
300	5.96	33.98	298	26.78	131.9	5.77	7.48	1478.
400	5.30	34.06	397	26.92	119.3	7.02	11.95	1478.
500	4.79	34.13	496	27.03	109.0	8.16	17.16	1477.
600	4.22	34.16	595	27.12	101.0	9.21	23.05	1476.
800	3.77	34.32	793	27.29	85.7	11.08	36.32	1478.
1000	3.42	34.42	991	27.41	75.8	12.70	51.09	1480.
1200	3.08	34.48	1188	27.49	69.1	14.13	67.15	1482.


TEMPERATURE, C
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PRESSURE, DB
REF. NO. 72 - 4 - 6
48-51.0 N 128-40.0 W
MO.-5 DAY-13 GMT-12.5
31
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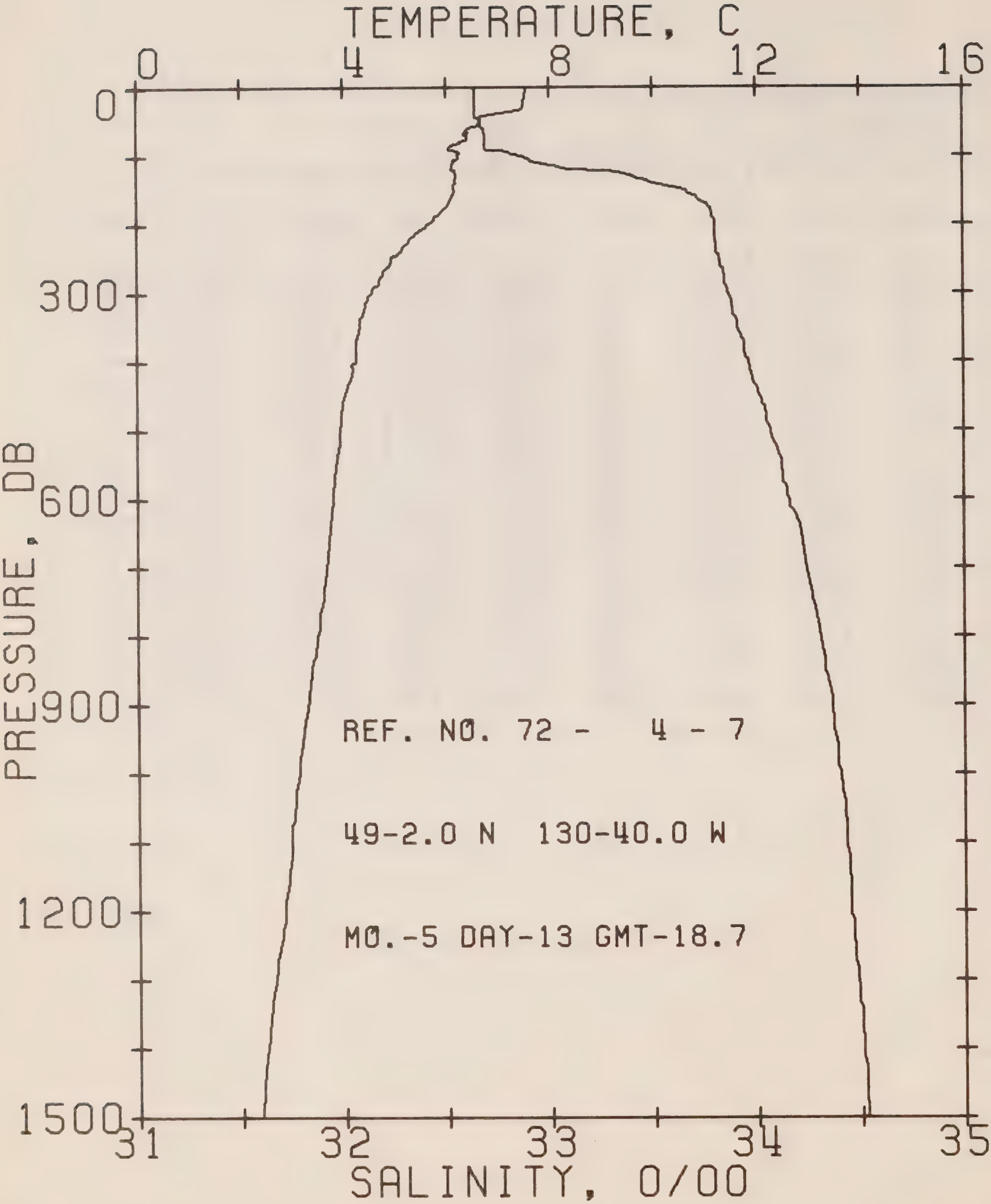
SALINITY, 0/00

CFFSHORE OCEANOGRAPHY GRCUP
REFERENCE NO. 72- 4- 6 DATE 13/ 5/72
POSITICN 48-51.0N, 128-40.0W GMT 12.5
RESULTS OF STP CAST 262 POINTS TAKEN FRCM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	8.06	32.50	0	25.33	265.5	0.0	0.0	1480.
10	8.06	32.50	10	25.33	265.6	0.27	0.01	1480.
20	7.91	32.50	20	25.35	263.5	0.53	0.05	1480.
30	7.02	32.53	30	25.50	249.8	0.78	0.12	1476.
50	6.82	32.59	50	25.57	243.2	1.28	0.32	1476.
75	6.50	32.70	75	25.70	231.6	1.87	0.70	1475.
100	6.51	33.12	99	26.03	200.5	2.42	1.18	1476.
125	6.72	33.68	124	26.44	161.6	2.87	1.70	1478.
150	6.57	33.78	149	26.54	152.6	3.26	2.25	1478.
175	6.28	33.84	174	26.62	145.0	3.64	2.87	1478.
200	5.96	33.85	199	26.67	140.4	3.99	3.55	1477.
225	5.63	33.85	223	26.71	136.7	4.34	4.30	1476.
250	5.45	33.88	248	26.76	132.5	4.67	5.11	1475.
300	5.21	33.93	298	26.83	126.6	5.32	6.92	1475.
400	4.68	34.01	397	26.95	115.6	6.53	11.22	1475.
500	4.40	34.12	496	27.07	105.3	7.63	16.26	1476.
600	4.08	34.20	595	27.17	96.6	8.64	21.93	1476.
800	3.79	34.33	793	27.30	85.1	10.46	34.85	1478.
1000	3.34	34.42	990	27.41	75.1	12.06	49.55	1480.
1200	2.92	34.47	1188	27.49	68.0	13.49	65.53	1481.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300
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PRESSURE, DB
REF. NO. 72 - 4 - 7
49-2.0 N 130-40.0 W
MO.-5 DAY-13 GMT-18.7
31
32
33
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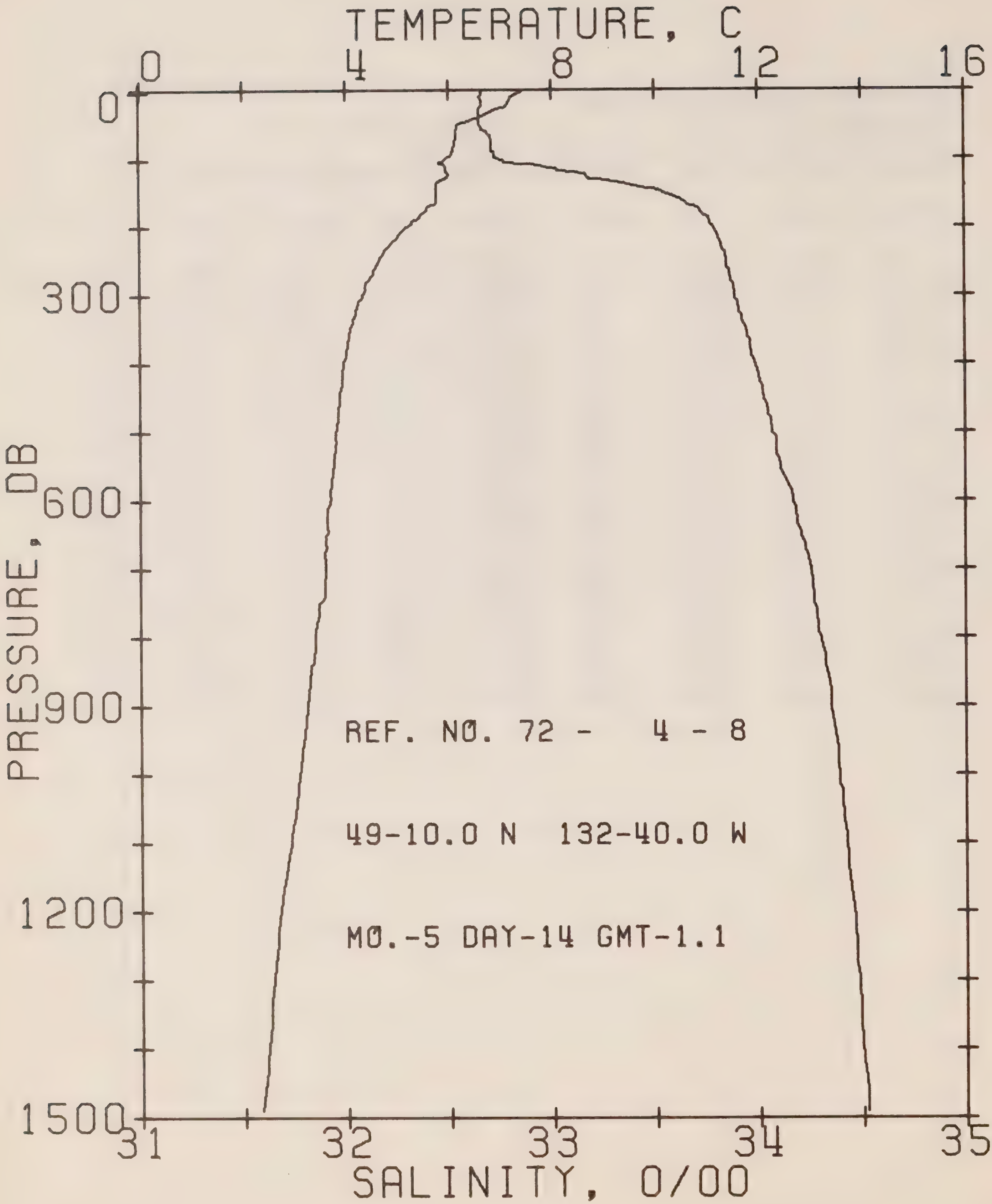
SALINITY, 0/00

OFFSHORF OCEANOGRAPHY GRCUP
REFERENCE NO. 72- 4- 7   DATE 13/ 5/72
POSITICN 49- 2.0N, 130-40.0W   GMT 18.7
RESULTS OF STP CAST   241 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.54	32.63	0	25.50	248.7	0.0	0.0	1478.
10	7.53	32.64	10	25.51	248.3	0.25	0.01	1478.
20	7.49	32.64	20	25.52	247.8	0.50	0.05	1478.
30	7.47	32.64	30	25.52	247.7	0.74	0.11	1478.
50	6.63	32.67	50	25.66	234.9	1.23	0.31	1475.
75	6.39	32.69	75	25.70	230.8	1.81	0.68	1475.
100	6.23	32.85	99	25.85	216.8	2.37	1.18	1475.
125	6.17	33.34	124	26.24	180.3	2.88	1.77	1476.
150	6.15	33.66	149	26.50	156.3	3.31	2.36	1476.
175	5.98	33.77	174	26.61	146.0	3.68	2.99	1476.
200	5.66	33.80	199	26.67	140.4	4.04	3.67	1475.
225	5.27	33.80	223	26.72	136.1	4.39	4.42	1474.
250	4.94	33.82	248	26.77	131.2	4.72	5.22	1473.
300	4.54	33.86	298	26.85	124.1	5.36	7.01	1472.
400	4.24	33.96	397	26.96	114.4	6.54	11.23	1473.
500	3.92	34.07	496	27.08	103.5	7.63	16.20	1473.
600	3.79	34.15	595	27.16	96.7	8.63	21.79	1475.
800	3.47	34.31	793	27.32	83.1	10.42	34.53	1477.
1000	3.10	34.40	990	27.42	73.7	11.99	48.87	1479.
1200	2.83	34.45	1188	27.49	68.3	13.40	64.67	1481.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300
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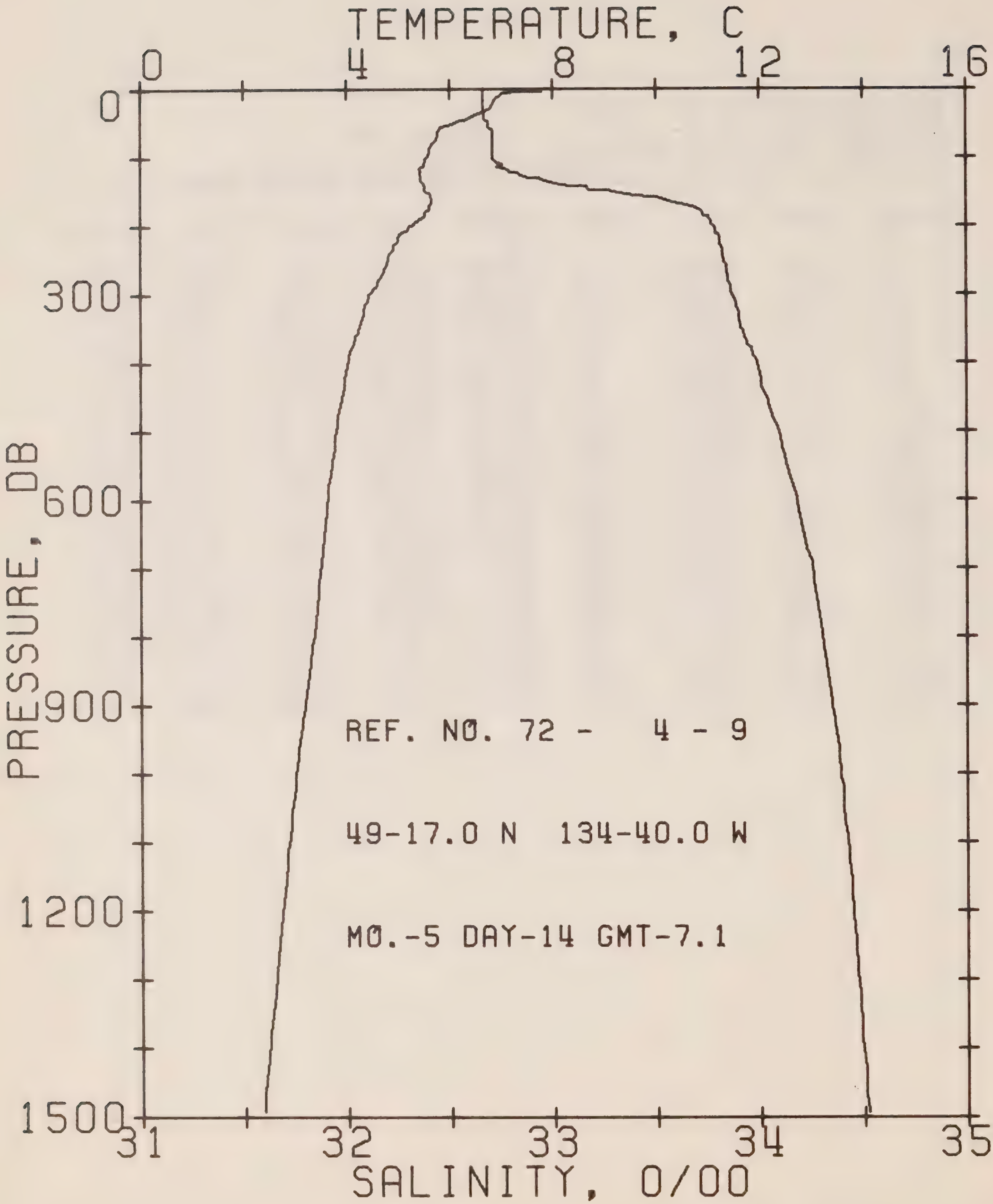
900
1200
1500
PRESSURE, DB
REF. NØ. 72 - 4 - 8
49-10.0 N 132-40.0 W
MØ.-5 DAY-14 GMT-1.1
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 8 DATE 14/ 5/72
POSITION 49-10.0N, 132-40.0W GMT 1.1
RESULTS OF STP CAST 237 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.42	32.65	0	25.54	245.6	0.0	0.0	1478.
10	7.22	32.65	10	25.56	243.3	0.24	0.01	1477.
20	7.14	32.66	20	25.58	241.8	0.49	0.05	1477.
30	6.91	32.65	30	25.61	239.6	0.73	0.11	1476.
50	6.21	32.65	50	25.70	231.2	1.20	0.30	1474.
75	6.11	32.71	75	25.75	226.0	1.77	0.67	1474.
100	5.96	32.74	99	25.80	222.4	2.33	1.17	1474.
125	5.98	33.17	124	26.13	190.8	2.85	1.76	1475.
150	5.75	33.55	149	26.46	159.6	3.29	2.37	1475.
175	5.56	33.72	174	26.62	145.0	3.67	3.00	1474.
200	5.19	33.78	199	26.71	136.4	4.02	3.67	1473.
225	4.86	33.82	223	26.78	130.0	4.35	4.39	1473.
250	4.64	33.85	248	26.83	125.6	4.67	5.17	1472.
300	4.31	33.89	298	26.90	119.5	5.29	6.88	1472.
400	3.95	33.98	397	27.01	109.6	6.43	10.95	1472.
500	3.80	34.07	496	27.09	102.4	7.48	15.79	1473.
600	3.69	34.17	595	27.18	94.4	8.47	21.32	1474.
800	3.39	34.30	793	27.31	83.3	10.24	33.91	1476.
1000	3.07	34.39	990	27.41	74.4	11.81	48.24	1478.
1200	2.70	34.46	1188	27.50	66.5	13.22	64.03	1480.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12
16
PRESSURE, DB
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300
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1200
1500
REF. NO. 72 - 4 - 9
49-17.0 N 134-40.0 W
MO.-5 DAY-14 GMT-7.1
31
32
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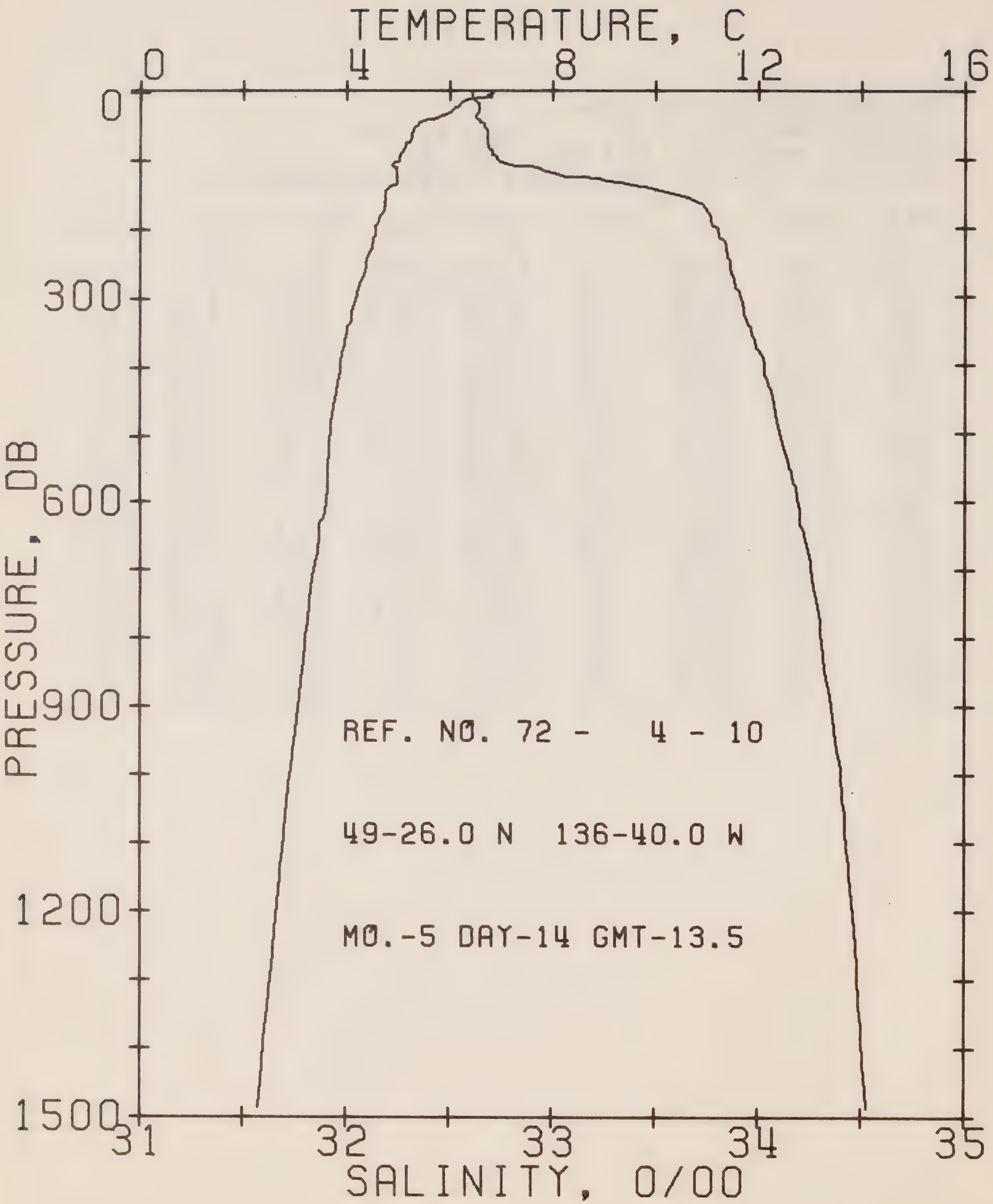
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 9 DATE 14/ 5/72
POSITION 49-17.0N, 134-40.0W GMT 7.1
RESULTS OF STP CAST 198 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.09	32.66	0	25.59	240.5	0.0	0.0	1476.
10	6.96	32.66	10	25.61	239.3	0.24	0.01	1476.
20	6.85	32.66	20	25.62	237.9	0.48	0.05	1476.
30	6.76	32.66	30	25.63	237.0	0.72	0.11	1476.
50	6.13	32.69	50	25.74	227.6	1.19	0.30	1473.
75	5.72	32.71	75	25.80	221.3	1.74	0.65	1472.
100	5.54	32.71	99	25.83	219.5	2.29	1.14	1472.
125	5.43	32.84	124	25.94	209.0	2.83	1.76	1472.
150	5.53	33.29	149	26.28	176.7	3.32	2.45	1473.
175	5.59	33.71	174	26.61	146.1	3.72	3.11	1475.
200	5.25	33.77	199	26.70	137.5	4.08	3.79	1474.
225	4.95	33.81	223	26.76	131.8	4.41	4.51	1473.
250	4.80	33.83	248	26.79	129.0	4.74	5.30	1473.
300	4.45	33.86	298	26.86	122.9	5.37	7.07	1472.
400	4.02	33.99	397	27.00	110.1	6.54	11.22	1472.
500	3.79	34.09	496	27.11	100.5	7.59	16.06	1473.
600	3.62	34.18	595	27.20	92.9	8.56	21.48	1474.
800	3.34	34.30	793	27.32	82.4	10.31	33.89	1476.
1000	2.99	34.39	990	27.42	73.4	11.86	48.11	1478.
1200	2.73	34.45	1188	27.49	67.3	13.26	63.84	1480.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300
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900
1200
1500
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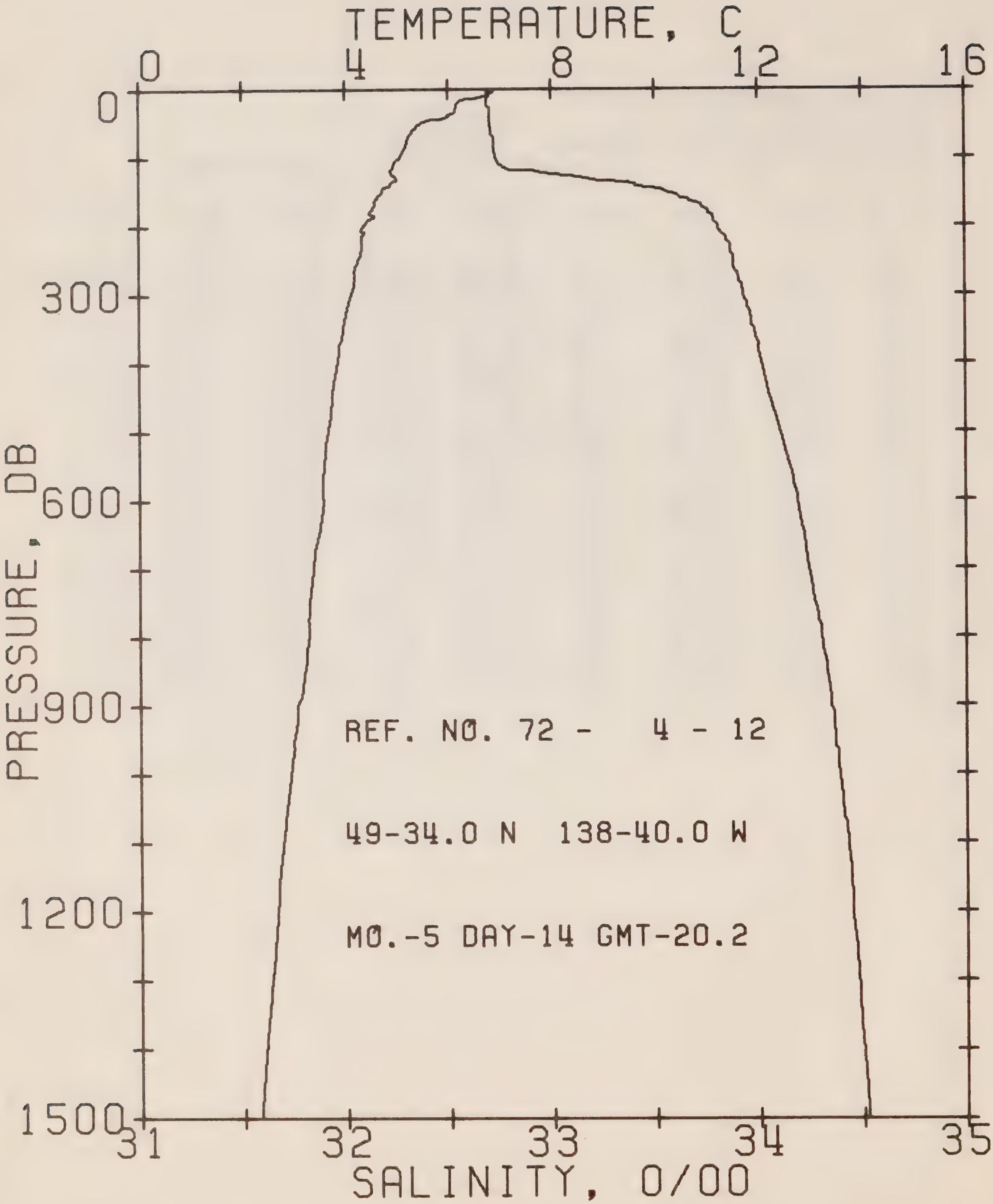
REF. NO. 72 - 4 - 10
49-26.0 N 136-40.0 W
MO.-5 DAY-14 GMT-13.5
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 10 DATE 14/ 5/72
POSITION 49-26.0N, 136-40.0W GMT 13.5
RESULTS OF STP CAST 186 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.86	32.61	0	25.58	241.4	0.0	0.0	1475.
10	6.78	32.61	10	25.59	240.7	0.24	0.01	1475.
20	6.20	32.64	20	25.69	231.6	0.48	0.05	1473.
30	6.03	32.64	30	25.71	229.6	0.71	0.11	1473.
50	5.38	32.67	50	25.81	220.1	1.16	0.29	1470.
75	5.20	32.68	75	25.84	217.6	1.70	0.64	1470.
100	5.01	32.73	99	25.90	212.1	2.24	1.12	1470.
125	4.97	33.06	124	26.17	187.1	2.74	1.69	1470.
150	4.75	33.57	149	26.60	146.7	3.15	2.26	1471.
175	4.71	33.74	174	26.74	133.4	3.49	2.83	1471.
200	4.54	33.79	199	26.80	128.1	3.82	3.46	1471.
225	4.47	33.84	223	26.84	124.2	4.14	4.14	1471.
250	4.35	33.86	248	26.87	121.7	4.45	4.89	1471.
300	4.18	33.91	298	26.93	116.4	5.05	6.56	1471.
400	3.87	34.03	397	27.05	105.3	6.16	10.52	1472.
500	3.68	34.10	496	27.13	98.6	7.18	15.19	1472.
600	3.61	34.19	595	27.21	91.9	8.13	20.51	1474.
800	3.20	34.30	793	27.34	80.7	9.84	32.71	1476.
1000	2.92	34.40	990	27.44	71.7	11.37	46.68	1478.
1200	2.65	34.46	1188	27.51	65.7	12.74	62.08	1480.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16
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300
600
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1200
1500
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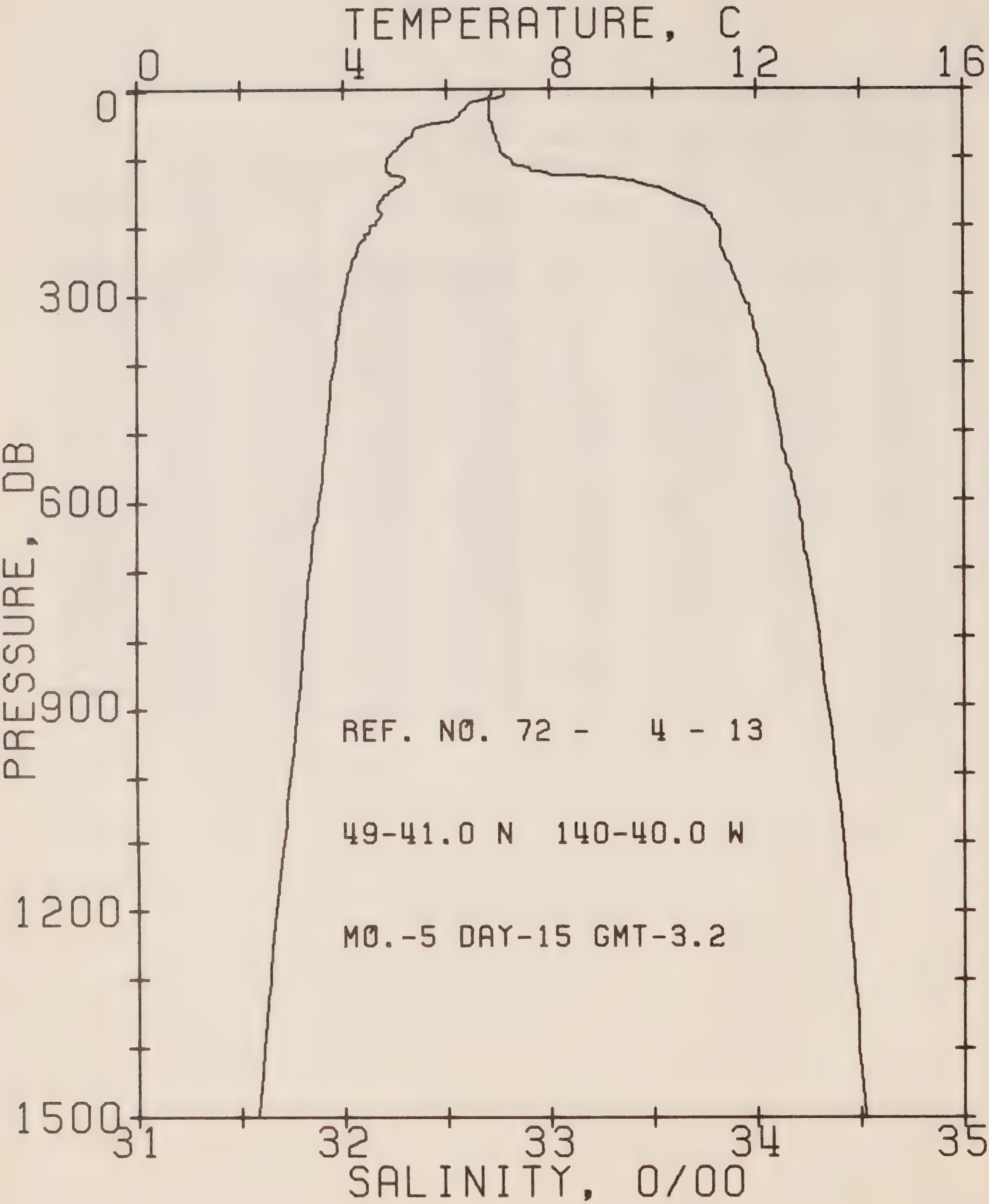
REF. NO. 72 - 4 - 12
49-34.0 N 138-40.0 W
MO.-5 DAY-14 GMT-20.2
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 12 DATE 14/ 5/72
POSITION 49-34.0N, 138-40.0W GMT 20.2
RESULTS OF STP CAST 184 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.77	32.68	0	25.65	235.0	0.0	0.0	1475.
10	6.80	32.69	10	25.65	235.0	0.24	0.01	1475.
20	6.19	32.69	20	25.73	227.7	0.47	0.05	1473.
30	6.13	32.70	30	25.75	226.3	0.69	0.10	1473.
50	5.47	32.70	50	25.83	218.9	1.14	0.29	1471.
75	5.21	32.72	75	25.87	214.8	1.68	0.63	1470.
100	5.07	32.73	99	25.90	212.8	2.22	1.11	1470.
125	4.92	33.05	124	26.16	187.4	2.73	1.70	1470.
150	4.70	33.56	149	26.59	147.0	3.15	2.28	1470.
175	4.53	33.74	174	26.76	131.7	3.49	2.85	1470.
200	4.34	33.80	199	26.82	125.4	3.81	3.46	1470.
225	4.31	33.86	223	26.87	121.3	4.12	4.13	1470.
250	4.24	33.88	248	26.90	119.0	4.42	4.86	1470.
300	4.09	33.93	298	26.95	114.1	5.01	6.49	1471.
400	3.84	34.01	397	27.04	106.0	6.10	10.40	1471.
500	3.65	34.10	496	27.13	98.3	7.12	15.08	1472.
600	3.56	34.19	595	27.21	91.6	8.07	20.36	1474.
800	3.26	34.30	793	27.33	81.4	9.79	32.63	1476.
1000	2.91	34.39	990	27.43	72.7	11.33	46.68	1478.
1200	2.64	34.45	1188	27.50	66.1	12.71	62.12	1480.
1500	2.31	34.52	1484	27.59	58.9	14.57	87.77	1484.


TEMPERATURE, C
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8
12
16
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300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 4 - 13
49-41.0 N 140-40.0 W
MO.-5 DAY-15 GMT-3.2
31
32
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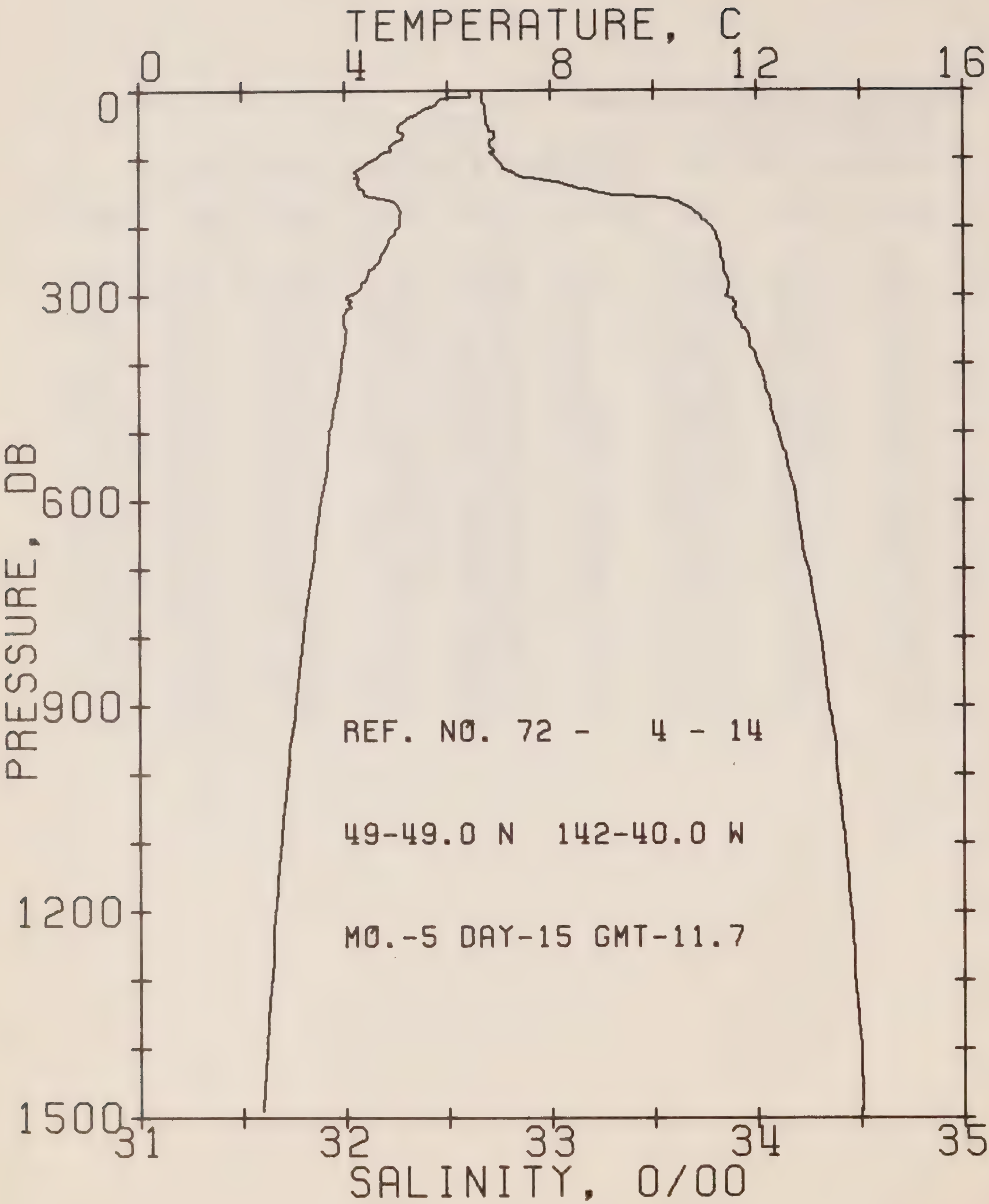
34
35
SALINITY, 0/00

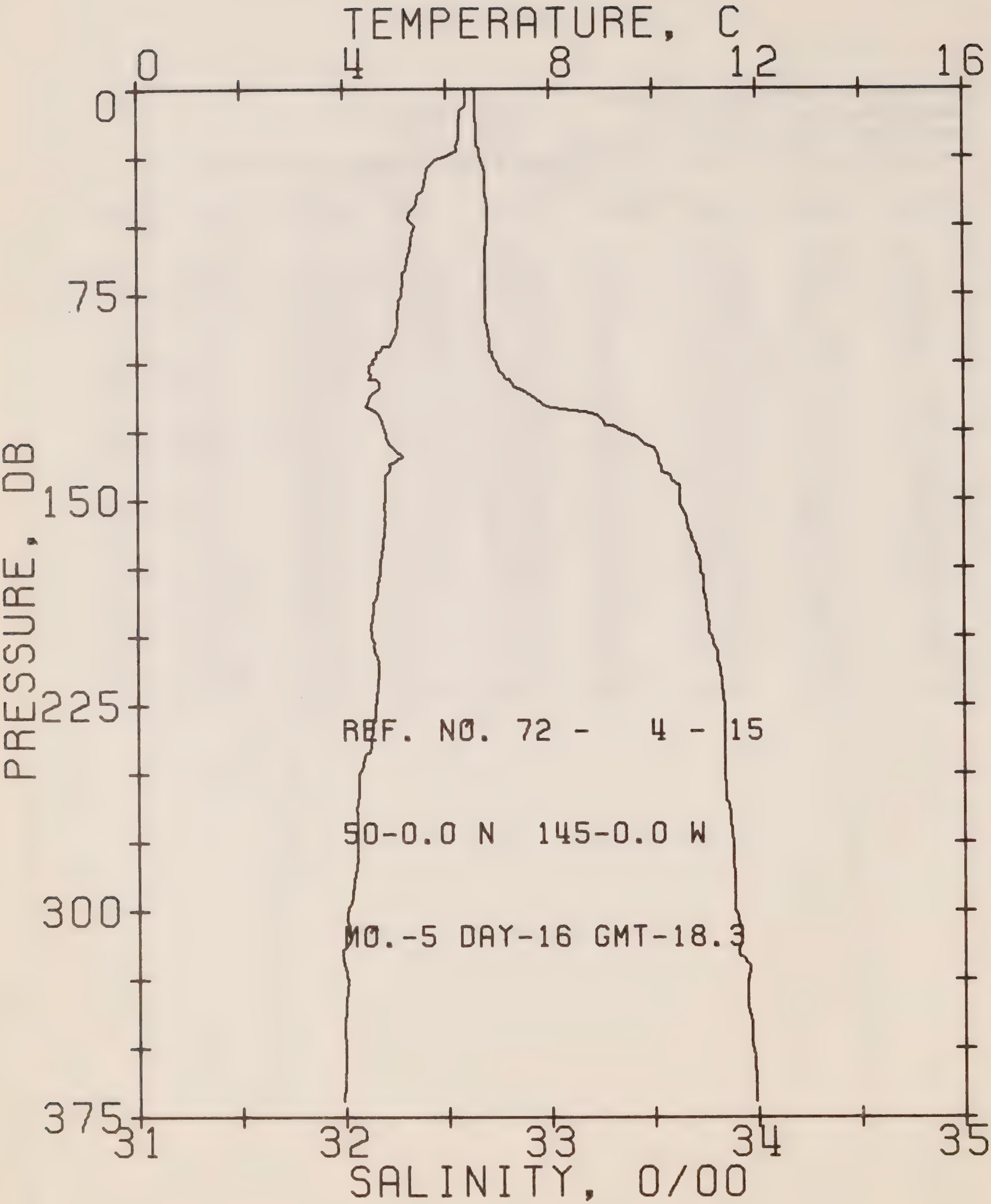
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 13 DATE 15/ 5/72
POSITION 49-41.0N, 140-40.0W GMT 3.2
RESULTS OF STP CAST 189 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.12	32.72	0	25.63	236.5	0.0	0.0	1477.
10	7.10	32.71	10	25.63	237.1	0.24	0.01	1477.
20	6.50	32.71	20	25.71	229.9	0.47	0.05	1474.
30	6.35	32.71	30	25.73	228.2	0.70	0.11	1474.
50	5.88	32.72	50	25.79	222.1	1.15	0.29	1472.
75	5.19	32.74	75	25.89	213.0	1.69	0.63	1470.
100	4.87	32.79	99	25.96	206.1	2.22	1.10	1469.
125	4.91	33.01	124	26.13	190.3	2.72	1.67	1470.
150	4.88	33.57	149	26.58	148.2	3.12	2.24	1471.
175	4.68	33.75	174	26.75	132.8	3.47	2.82	1471.
200	4.55	33.82	199	26.81	126.6	3.80	3.44	1471.
225	4.31	33.83	223	26.85	123.4	4.11	4.12	1470.
250	4.18	33.86	248	26.88	120.2	4.42	4.86	1470.
300	4.02	33.93	298	26.96	113.5	5.00	6.49	1470.
400	3.81	34.03	397	27.06	104.7	6.08	10.34	1471.
500	3.66	34.11	496	27.14	97.6	7.09	14.95	1472.
600	3.50	34.20	595	27.22	90.5	8.03	20.23	1473.
800	3.20	34.30	793	27.33	81.0	9.74	32.41	1476.
1000	2.95	34.38	990	27.42	73.4	11.29	46.58	1478.
1200	2.68	34.45	1188	27.50	66.6	12.69	62.24	1480.
1500	2.33	34.52	1484	27.59	59.1	14.58	88.16	1484.


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 4 - 14
49-49.0 N 142-40.0 W
MO.-5 DAY-15 GMT-11.7
31
32
33
34
35
SALINITY, 0/00

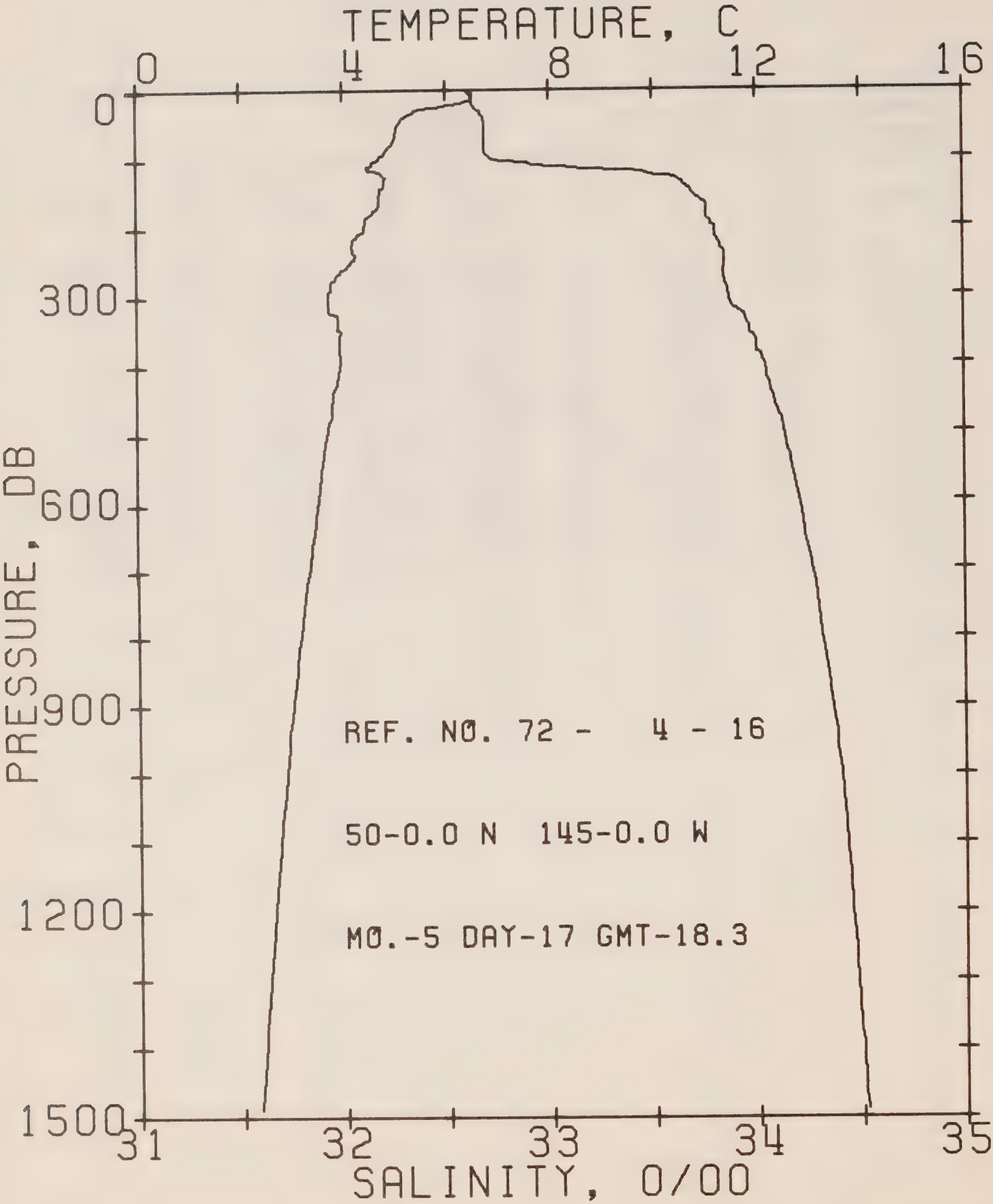
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 14 DATE 15/ 5/72
POSITION 49-49.0N, 142-40.0W GMT 11.7
RESULTS OF STP CAST 179 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.42	32.67	0	25.69	231.5	0.0	0.0	1474.
10	6.44	32.67	10	25.68	232.0	0.23	0.01	1474.
20	5.76	32.67	20	25.77	223.8	0.46	0.05	1471.
30	5.49	32.68	30	25.81	220.4	0.68	0.10	1470.
50	5.07	32.69	50	25.86	215.3	1.12	0.28	1469.
75	5.01	32.71	75	25.89	213.4	1.65	0.62	1469.
100	4.63	32.74	99	25.95	207.5	2.18	1.09	1468.
125	4.27	32.85	124	26.08	195.6	2.68	1.67	1467.
150	4.36	33.25	149	26.38	166.6	3.13	2.30	1468.
175	5.07	33.69	174	26.65	141.8	3.51	2.92	1472.
200	5.05	33.78	199	26.73	134.8	3.85	3.58	1473.
225	4.83	33.82	223	26.78	129.7	4.18	4.29	1472.
250	4.65	33.83	248	26.82	126.9	4.50	5.07	1472.
300	4.09	33.85	298	26.89	119.9	5.12	6.79	1471.
400	3.92	34.00	397	27.03	107.7	6.25	10.82	1472.
500	3.69	34.10	496	27.13	98.5	7.28	15.54	1472.
600	3.51	34.19	595	27.22	91.0	8.23	20.84	1474.
800	3.17	34.31	793	27.34	79.8	9.94	33.04	1475.
1000	2.87	34.39	990	27.43	72.3	11.46	46.95	1478.
1200	2.63	34.45	1188	27.50	66.0	12.84	62.38	1480.


TEMPERATURE, C
0
4
8
12
16
0
75
150
225
300
375
PRESSURE, DB
REF. NO. 72 - 4 - 15
50-0.0 N 145-0.0 W
MO.-5 DAY-16 GMT-18.3
31
32
33
34
35
SALINITY, 0/00

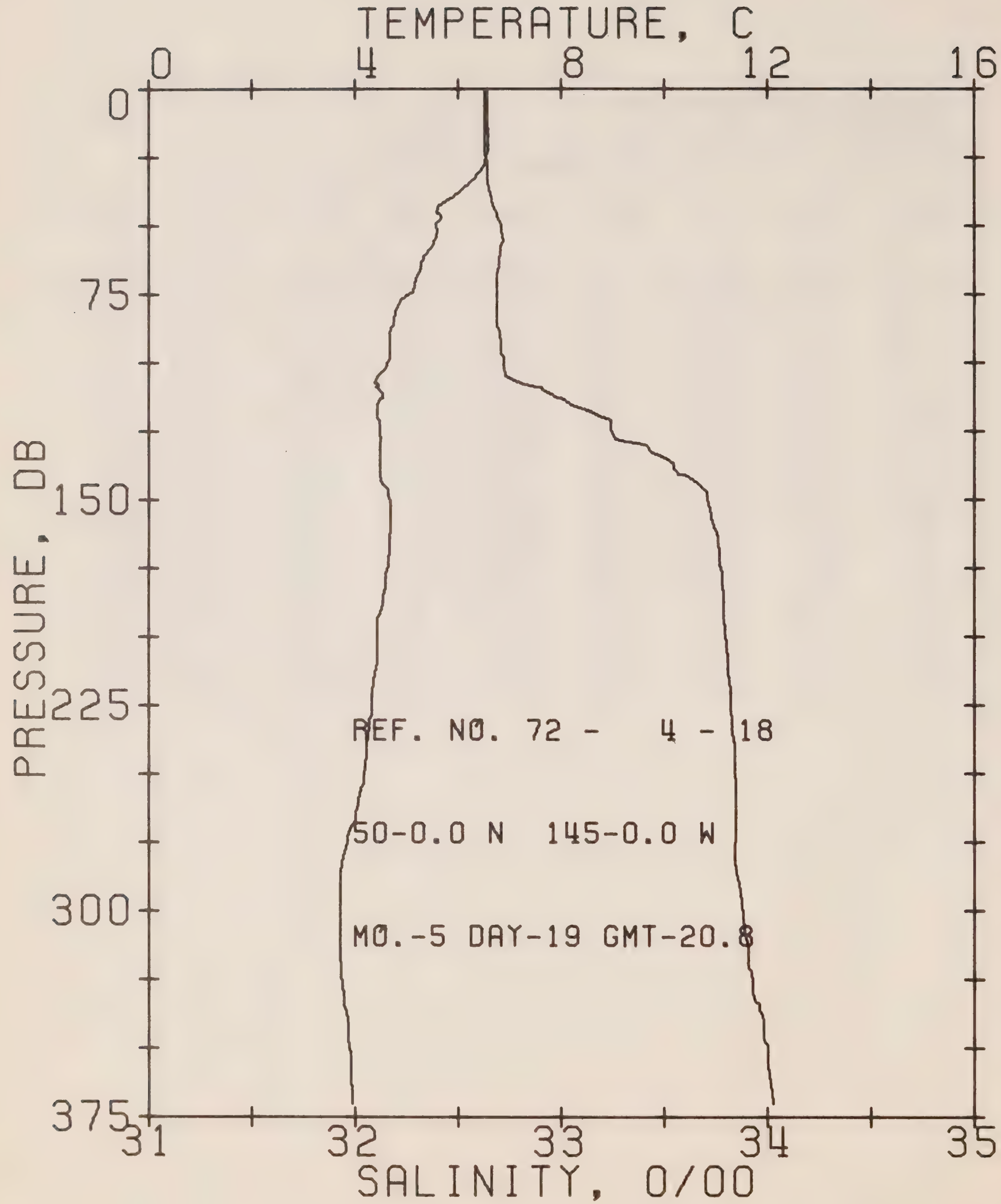
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 15 DATE 16/ 5/72
POSITION 50- 0.0N, 145- 0.0W GMT 18.3
RESULTS OF STP CAST 159 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.38	32.63	0	25.66	233.9	0.0	0.0	1473.
10	6.26	32.64	10	25.68	232.1	0.23	0.01	1473.
20	6.21	32.65	20	25.70	230.9	0.46	0.05	1473.
30	5.61	32.68	30	25.80	221.5	0.69	0.10	1471.
50	5.38	32.70	50	25.84	217.9	1.13	0.28	1470.
75	5.11	32.69	75	25.86	215.9	1.67	0.63	1470.
100	4.58	32.74	99	25.96	206.8	2.20	1.10	1468.
125	4.80	33.35	124	26.42	163.2	2.68	1.64	1470.
150	4.79	33.63	149	26.64	142.7	3.06	2.17	1471.
175	4.68	33.73	174	26.73	134.2	3.40	2.75	1471.
200	4.54	33.78	199	26.78	129.3	3.73	3.38	1471.
225	4.59	33.84	223	26.83	125.7	4.05	4.07	1471.
250	4.27	33.84	248	26.86	122.4	4.36	4.82	1471.
300	4.02	33.89	298	26.93	116.4	4.96	6.49	1470.


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 4 - 16
50-0.0 N 145-0.0 W
MO.-5 DAY-17 GMT-18.3
31
32
33
34
35
SALINITY, 0/00

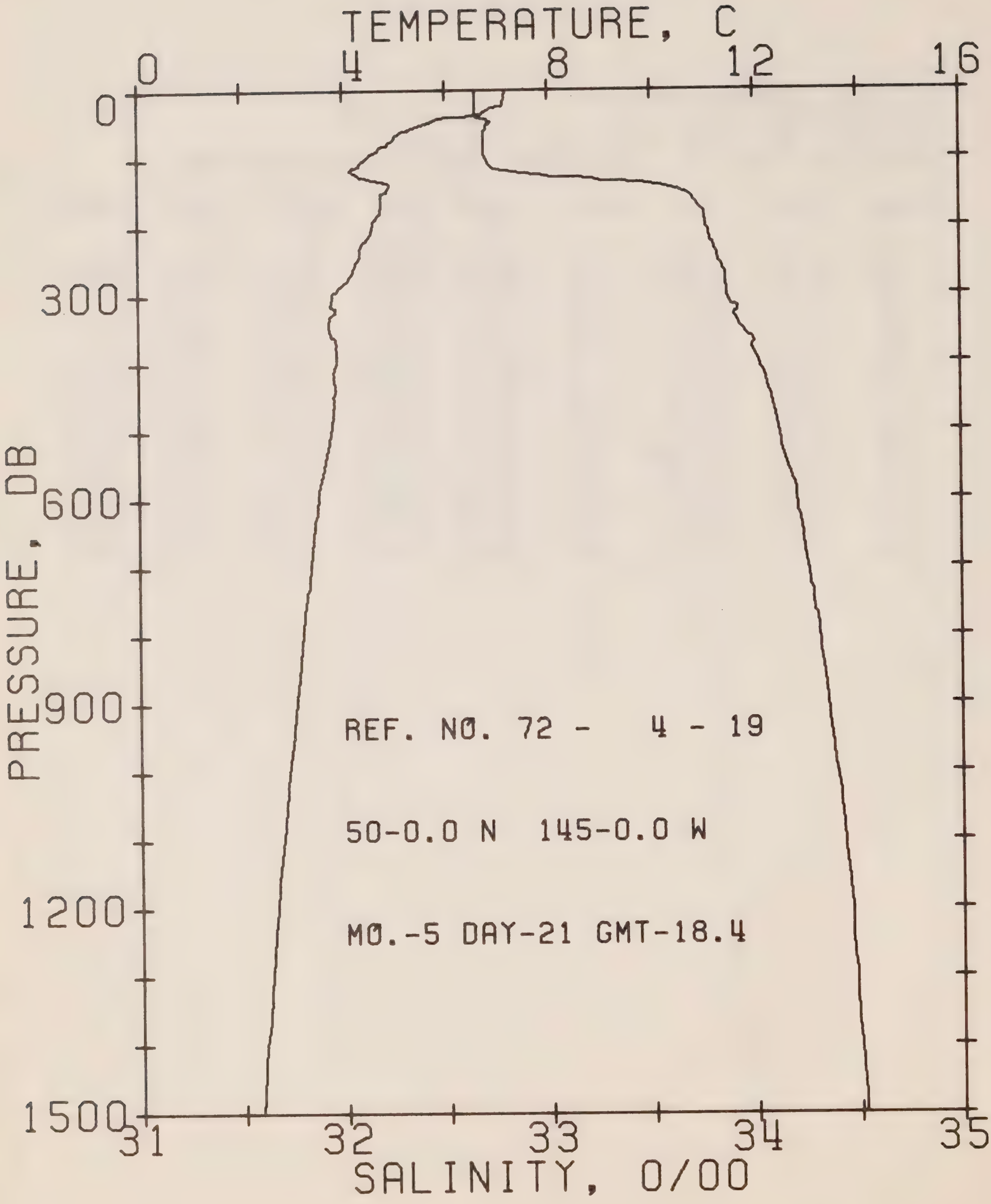
CFFSHCRE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 16 DATE 17/ 5/72
POSITICN 50- 0.0N, 145- 0.0W GMT 18.3
RESULTS OF STP CAST 182 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.52	32.60	0	25.62	237.9	0.0	0.0	1474.
10	6.49	32.63	10	25.65	235.6	0.24	0.01	1474.
20	6.28	32.63	20	25.67	233.2	0.47	0.05	1473.
30	5.44	32.66	30	25.80	221.4	0.70	0.11	1470.
50	5.07	32.69	50	25.86	215.3	1.13	0.28	1469.
75	4.97	32.69	75	25.87	214.4	1.67	0.63	1469.
100	4.70	32.72	99	25.93	209.5	2.20	1.10	1468.
125	4.79	33.52	124	26.55	150.7	2.66	1.62	1470.
150	4.71	33.69	149	26.69	137.3	3.01	2.11	1471.
175	4.62	33.76	174	26.76	131.4	3.35	2.67	1471.
200	4.39	33.79	199	26.81	126.6	3.67	3.28	1470.
225	4.17	33.82	223	26.86	122.5	3.98	3.96	1470.
250	4.16	33.85	248	26.88	120.5	4.29	4.70	1470.
300	3.71	33.86	298	26.94	115.1	4.88	6.35	1469.
400	3.93	34.03	397	27.05	105.5	5.98	10.26	1472.
500	3.68	34.13	496	27.15	96.4	6.99	14.89	1473.
600	3.48	34.20	595	27.23	89.9	7.92	20.10	1473.
800	3.13	34.31	793	27.35	79.4	9.60	32.09	1475.
1000	2.86	34.40	990	27.44	71.1	11.10	45.81	1478.
1200	2.62	34.45	1188	27.51	65.9	12.47	61.12	1480.


TEMPERATURE, C
0
4
8
12
16
0
75
150
225
300
375
PRESSURE, DB
REF. NO. 72 - 4 - 18
50-0.0 N 145-0.0 W
MO.-5 DAY-19 GMT-20.8
31
32
33
34
35
SALINITY, 0/00

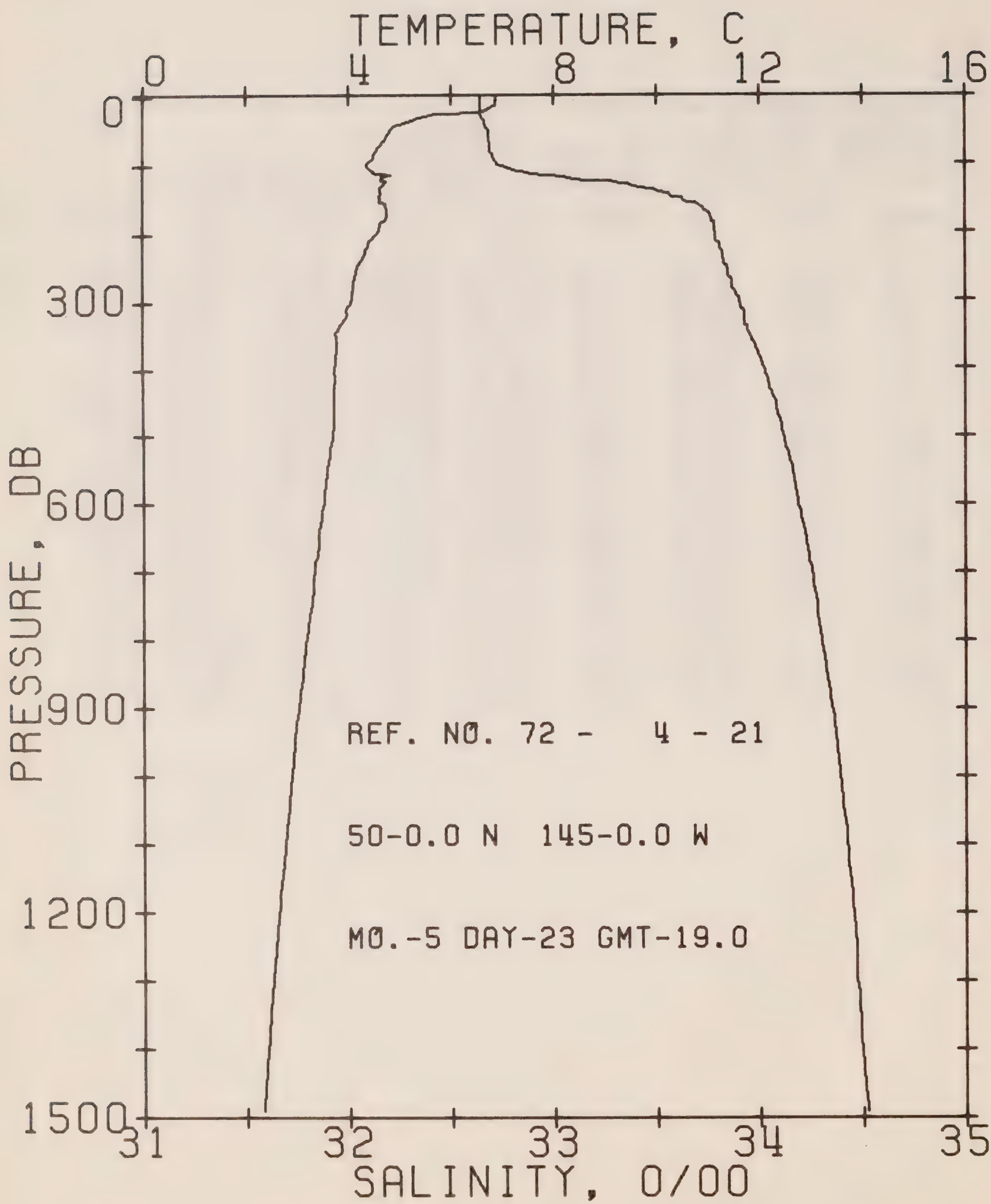
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 18   DATE 19/ 5/72
POSITION 50- 0.0N, 145- 0.0W   GMT 20.8
RESULTS OF STP CAST   145 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.57	32.63	0	25.64	236.3	0.0	0.0	1474.
10	6.57	32.63	10	25.63	236.6	0.24	0.01	1474.
20	6.58	32.63	20	25.63	236.8	0.47	0.05	1475.
30	6.43	32.64	30	25.66	234.4	0.71	0.11	1474.
50	5.56	32.71	50	25.82	219.2	1.16	0.29	1471.
75	5.05	32.69	75	25.87	215.3	1.71	0.64	1469.
100	4.62	32.72	99	25.94	208.7	2.23	1.11	1468.
125	4.49	33.24	124	26.36	168.6	2.70	1.65	1469.
150	4.69	33.71	149	26.71	135.6	3.07	2.16	1470.
175	4.63	33.77	174	26.77	130.4	3.41	2.71	1471.
200	4.43	33.80	199	26.81	126.9	3.73	3.33	1470.
225	4.32	33.82	223	26.84	124.2	4.04	4.00	1470.
250	4.17	33.84	248	26.87	121.3	4.35	4.75	1470.
300	3.70	33.88	298	26.95	113.9	4.93	6.39	1469.


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 4 - 19
50-0.0 N 145-0.0 W
MO.-5 DAY-21 GMT-18.4
31
32
33
34
35
SALINITY, 0/00

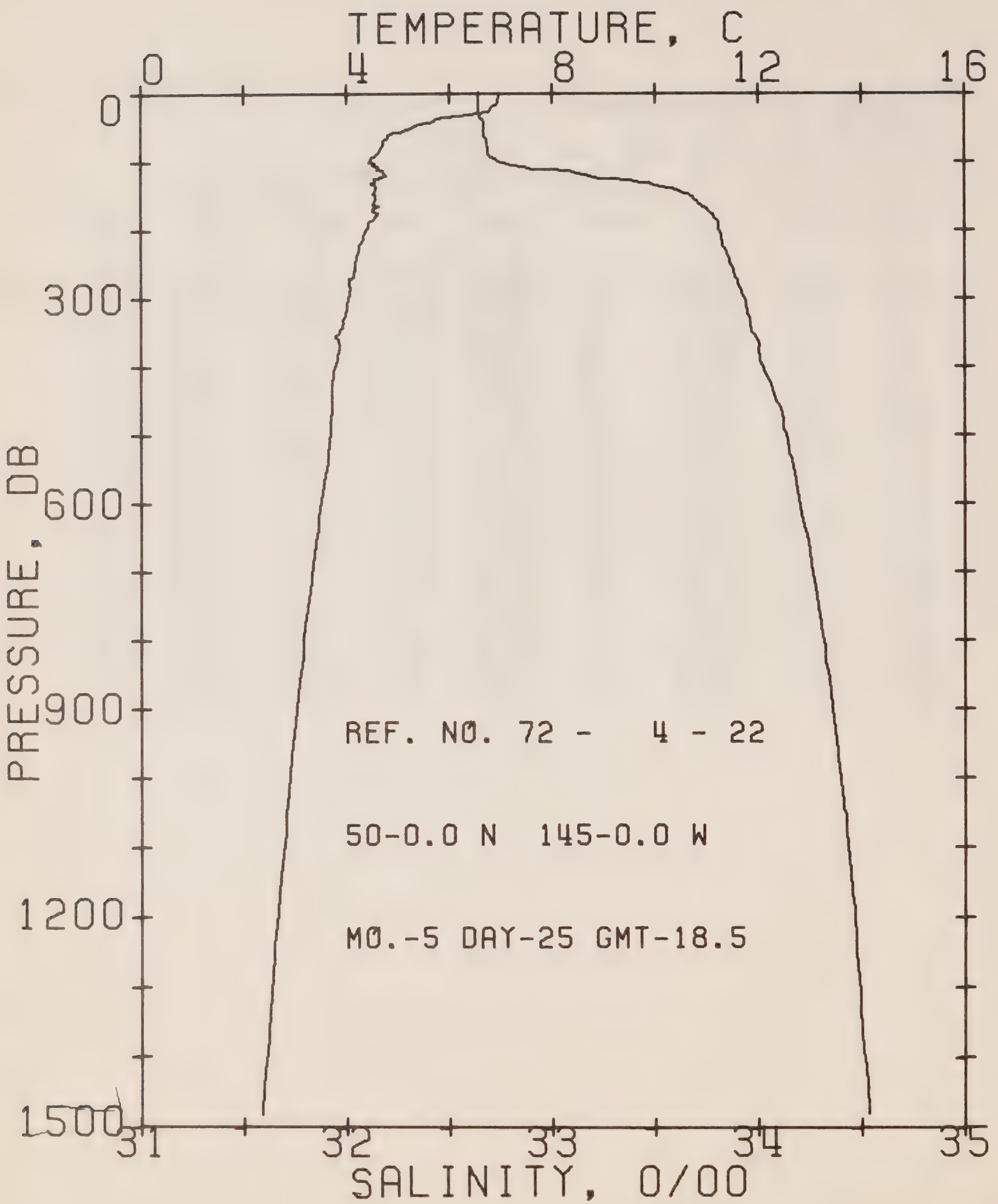
CFFSHCRE OCEANOGRAPHY GRCUP
REFERENCE NO. 72- 4- 19 DATE 21/ 5/72
POSITICN 50- 0.0N, 145- 0.0W GMT 18.4
RESULTS OF STP CAST 183 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.16	32.64	0	25.56	243.0	0.0	0.0	1477.
10	7.15	32.65	10	25.57	242.4	0.24	0.01	1477.
20	7.13	32.65	20	25.58	242.3	0.48	0.05	1477.
30	6.83	32.65	30	25.62	238.7	0.73	0.11	1476.
50	5.65	32.71	50	25.82	219.8	1.18	0.30	1471.
75	4.93	32.69	75	25.88	214.0	1.73	0.64	1469.
100	4.47	32.70	99	25.93	208.9	2.25	1.11	1467.
125	4.29	32.97	124	26.17	186.5	2.76	1.69	1467.
150	4.86	33.66	149	26.65	141.2	3.16	2.25	1471.
175	4.73	33.74	174	26.73	133.9	3.50	2.81	1471.
200	4.57	33.77	199	26.77	130.4	3.83	3.44	1471.
225	4.38	33.80	223	26.82	126.3	4.15	4.14	1471.
250	4.28	33.83	248	26.85	123.2	4.47	4.90	1471.
300	3.80	33.87	298	26.93	115.6	5.06	6.57	1469.
400	3.86	34.02	397	27.05	105.8	6.16	10.49	1471.
500	3.74	34.12	496	27.14	98.1	7.18	15.14	1473.
600	3.49	34.20	595	27.23	89.9	8.12	20.40	1473.
800	3.17	34.31	793	27.34	80.0	9.82	32.47	1475.
1000	2.89	34.39	990	27.43	72.3	11.34	46.42	1478.
1200	2.64	34.46	1188	27.51	65.4	12.71	61.77	1480.


TEMPERATURE, C
0
4
8
12
16
PRESSURE, DB
0
300
600
900
1200
1500
REF. NØ. 72 - 4 - 21
50-0.0 N 145-0.0 W
MØ.-5 DAY-23 GMT-19.0
31
32
33
34
35
SALINITY, 0/00

CFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 21 DATE 23/ 5/72
POSITICN 50- 0.0N, 145- 0.0W GMT 19.0
RESULTS OF STP CAST 248 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.87	32.63	0	25.60	240.0	0.0	0.0	1475.
10	6.86	32.64	10	25.61	239.5	0.24	0.01	1476.
20	6.74	32.64	20	25.62	238.1	0.48	0.05	1475.
30	5.59	32.64	30	25.76	224.6	0.71	0.11	1471.
50	4.85	32.67	50	25.87	214.2	1.15	0.29	1468.
75	4.60	32.69	75	25.91	210.5	1.68	0.62	1467.
100	4.38	32.72	99	25.96	206.3	2.20	1.09	1467.
125	4.63	33.14	124	26.27	177.5	2.69	1.65	1469.
150	4.59	33.58	149	26.62	144.3	3.08	2.20	1470.
175	4.76	33.75	174	26.74	133.3	3.43	2.76	1471.
200	4.57	33.78	199	26.78	129.6	3.75	3.39	1471.
225	4.33	33.81	223	26.83	125.1	4.07	4.08	1470.
250	4.17	33.84	248	26.87	121.3	4.38	4.82	1470.
300	4.06	33.90	298	26.93	116.1	4.97	6.49	1471.
400	3.72	34.02	397	27.06	104.3	6.07	10.40	1471.
500	3.68	34.12	496	27.14	97.5	7.08	15.01	1472.
600	3.51	34.19	595	27.22	91.0	8.02	20.28	1473.
800	3.17	34.30	793	27.34	80.6	9.73	32.43	1475.
1000	2.88	34.39	990	27.43	72.2	11.25	46.34	1478.
1200	2.61	34.45	1188	27.51	65.6	12.62	61.75	1480.


TEMPERATURE, C
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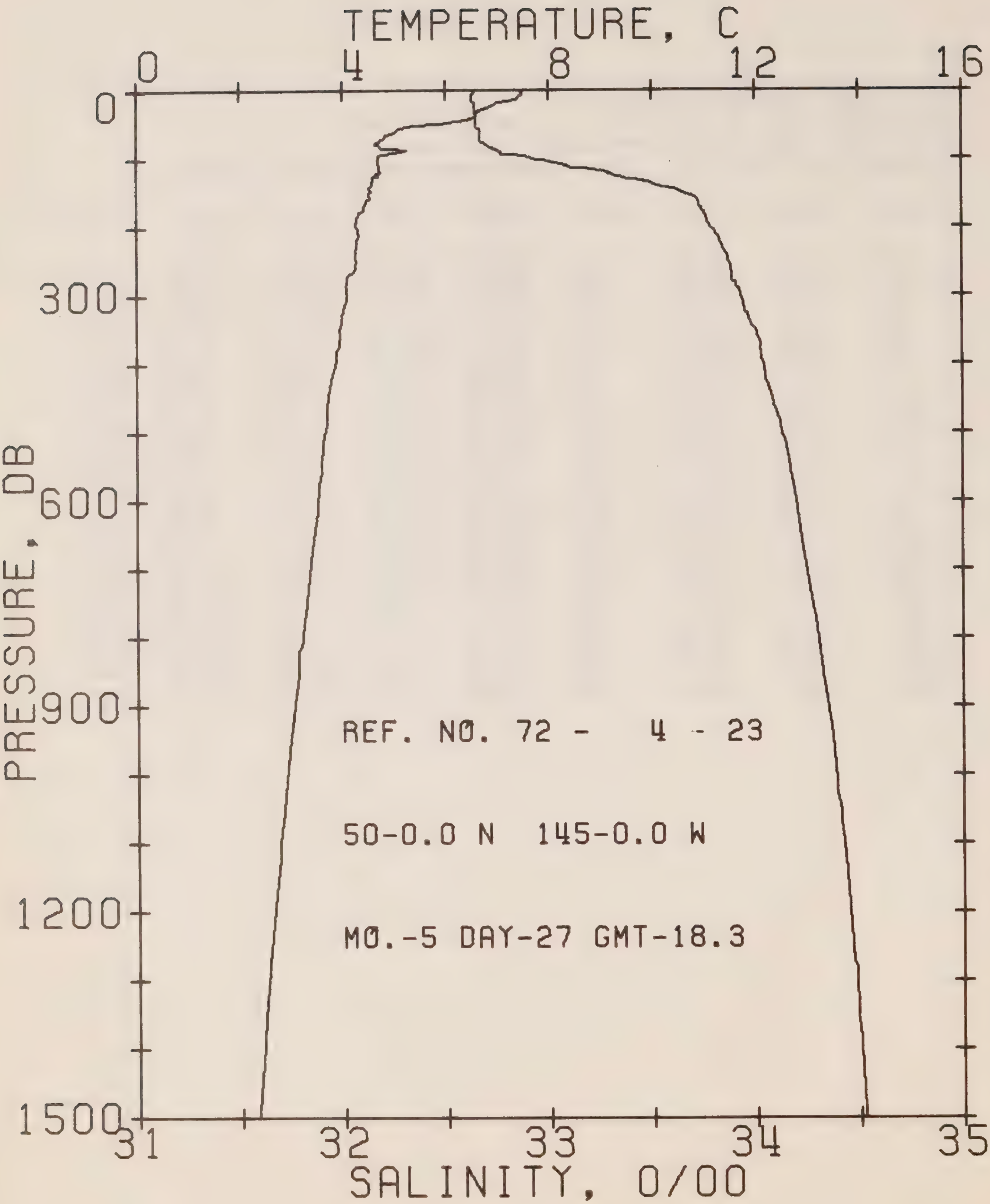
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NØ. 72 - 4 - 22
50-0.0 N 145-0.0 W
MØ.-5 DAY-25 GMT-18.5
31
32
33
34
35
SALINITY, 0/00

CFFSHORE OCEANOGRAPHY GROUP
REFFRENCE NO. 72- 4- 22 DATE 25/ 5/72
POSITION 50- 0.0N, 145- 0.0W GMT 18.5
RESULTS OF STP CAST 178 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.96	32.64	0	25.59	240.4	0.0	0.0	1476.
10	6.93	32.64	10	25.60	240.3	0.24	0.01	1476.
20	6.86	32.64	20	25.61	239.7	0.48	0.05	1476.
30	6.56	32.64	30	25.64	236.C	0.72	0.11	1475.
50	5.31	32.67	50	25.82	219.4	1.17	0.29	1470.
75	4.71	32.68	75	25.89	212.5	1.71	0.64	1468.
100	4.46	32.73	99	25.96	206.0	2.23	1.10	1467.
125	4.59	33.24	124	26.35	169.6	2.71	1.65	1469.
150	4.55	33.67	149	26.70	137.1	3.08	2.17	1470.
175	4.55	33.76	174	26.77	130.4	3.42	2.72	1470.
200	4.38	33.81	199	26.83	125.3	3.73	3.33	1470.
225	4.24	33.83	223	26.86	122.6	4.C4	4.00	1470.
250	4.16	33.86	248	26.89	119.5	4.35	4.73	1470.
300	4.03	33.93	298	26.96	113.6	4.93	6.36	1470.
400	3.77	34.01	397	27.05	105.3	6.02	10.25	1471.
500	3.67	34.13	496	27.15	96.7	7.02	14.83	1472.
600	3.49	34.20	595	27.22	90.3	7.96	20.06	1473.
800	3.16	34.31	793	27.35	79.7	9.65	32.11	1475.
1000	2.87	34.39	990	27.44	71.9	11.16	45.97	1478.
1200	2.63	34.46	1188	27.51	65.3	12.54	61.33	1480.


TEMPERATURE, C
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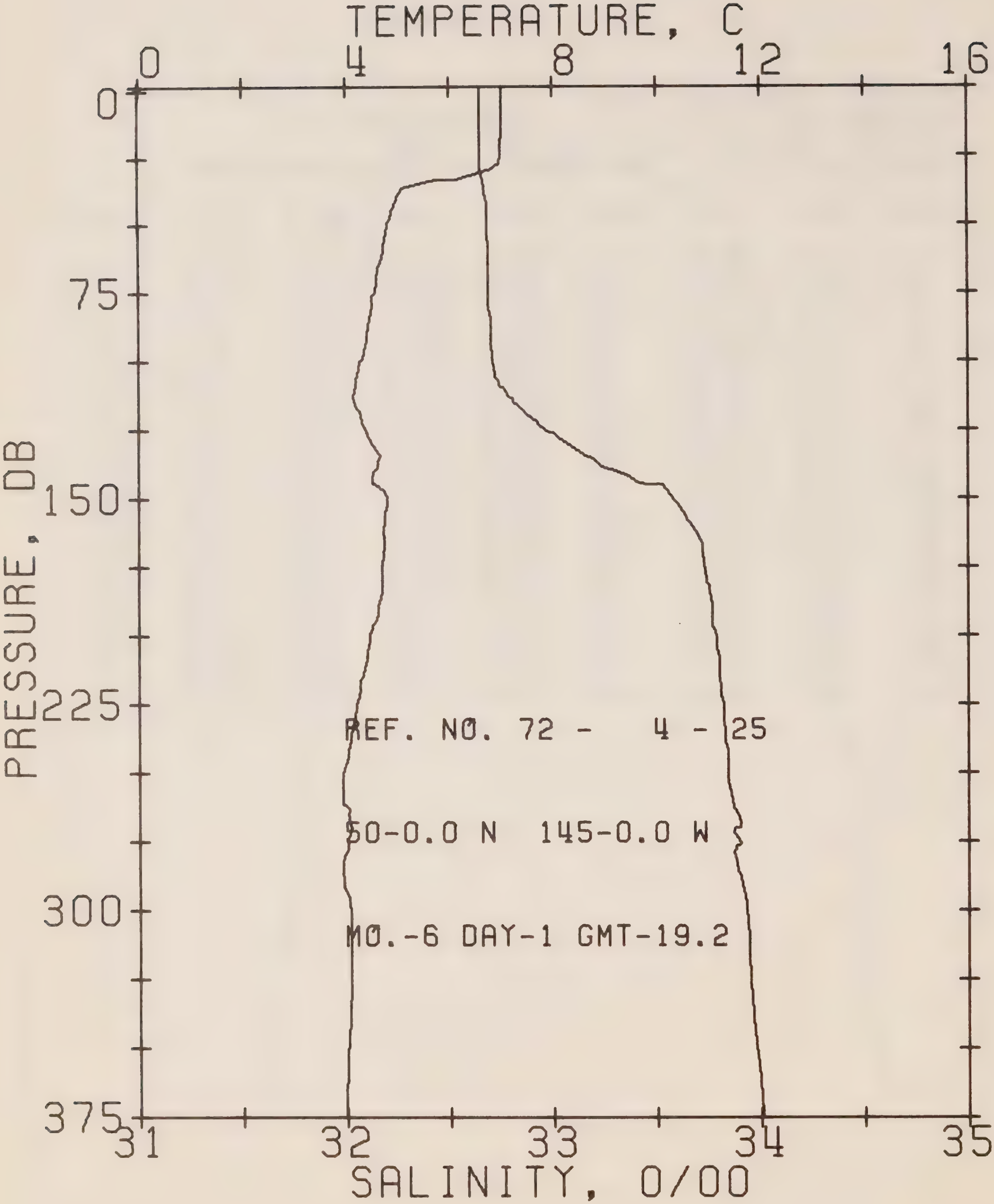
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 4 - 23
50-0.0 N 145-0.0 W
MO.-5 DAY-27 GMT-18.3
31
32
33
34
35
SALINITY, 0/00

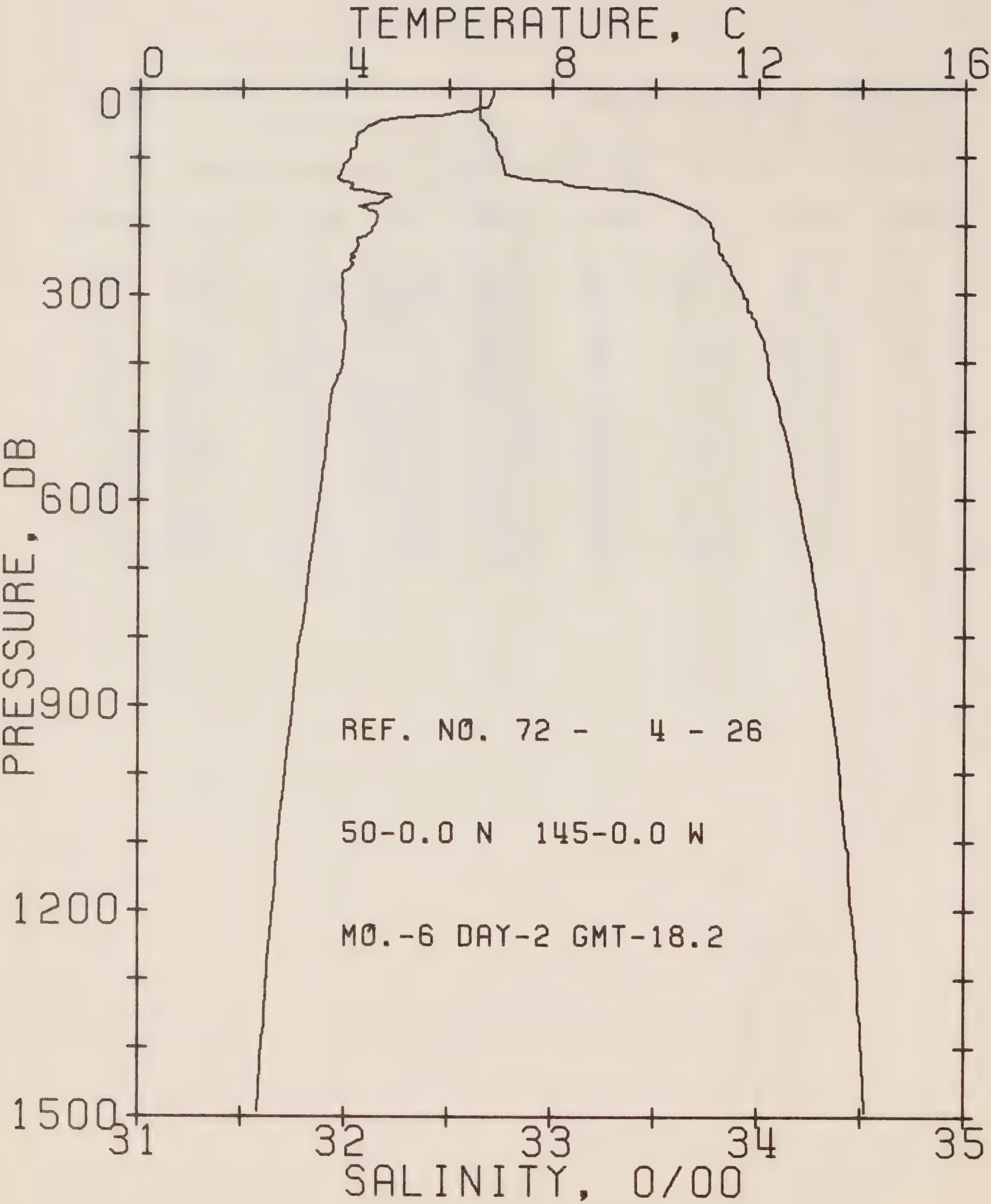
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 23 DATE 27/ 5/72
POSITION 50- 0.0N, 145- 0.0W GMT 18.3
RESULTS OF STP CAST 194 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.46	32.64	0	25.52	246.9	0.0	0.0	1478.
10	7.42	32.63	10	25.52	247.4	0.25	0.01	1478.
20	6.96	32.64	20	25.59	240.8	0.49	0.05	1476.
30	6.65	32.64	30	25.63	237.1	0.73	0.11	1475.
50	5.97	32.65	50	25.73	228.4	1.20	0.30	1473.
75	4.72	32.67	75	25.89	213.0	1.74	0.65	1468.
100	4.70	32.91	99	26.08	195.2	2.26	1.11	1469.
125	4.62	33.32	124	26.41	163.9	2.71	1.62	1469.
150	4.52	33.65	149	26.68	138.4	3.08	2.14	1470.
175	4.40	33.74	174	26.77	130.6	3.42	2.69	1470.
200	4.26	33.78	199	26.81	126.3	3.74	3.31	1470.
225	4.27	33.83	223	26.86	122.5	4.05	3.98	1470.
250	4.26	33.87	248	26.89	119.9	4.35	4.71	1470.
300	4.07	33.93	298	26.95	113.9	4.93	6.35	1471.
400	3.84	34.04	397	27.06	104.2	6.02	10.21	1471.
500	3.64	34.13	496	27.15	96.3	7.02	14.80	1472.
600	3.51	34.19	595	27.22	90.7	7.95	20.01	1474.
800	3.19	34.30	793	27.33	80.9	9.67	32.22	1476.
1000	2.89	34.39	990	27.43	72.5	11.20	46.22	1478.
1200	2.63	34.45	1188	27.50	66.0	12.58	61.70	1480.


TEMPERATURE, C
0
4
8
12
16
0
75
150
225
300
375
PRESSURE, DB
REF. NO. 72 - 4 - 25
50-0.0 N 145-0.0 W
MO.-6 DAY-1 GMT-19.2
31
32
33
34
35
SALINITY, 0/00

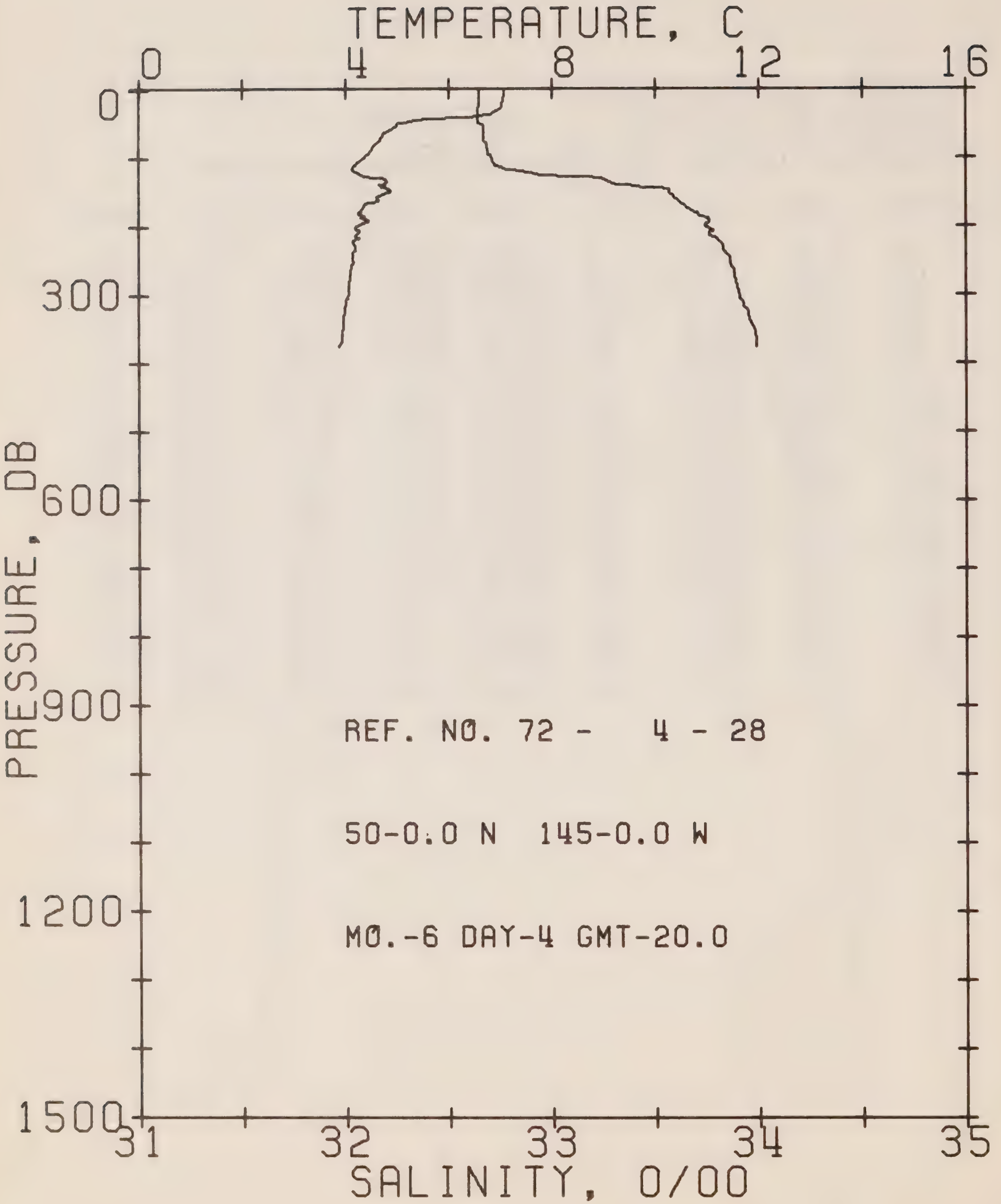
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 25   DATE 1/ 6/72
POSITION 50- 0.0N. 145- 0.0W   GMT 19.2
RESULTS OF STP CAST   142 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.02	32.64	0	25.58	241.2	0.0	0.0	1476.
10	7.00	32.65	10	25.59	240.5	0.24	0.01	1476.
20	6.99	32.65	20	25.60	240.6	0.48	0.05	1476.
30	6.83	32.65	30	25.62	238.6	0.72	0.11	1476.
50	4.79	32.68	50	25.89	213.1	1.16	0.29	1468.
75	4.57	32.69	75	25.92	210.3	1.69	0.62	1467.
100	4.28	32.71	99	25.96	206.0	2.21	1.09	1467.
125	4.40	32.96	124	26.15	188.7	2.71	1.66	1468.
150	4.80	33.58	149	26.60	146.6	3.13	2.25	1471.
175	4.70	33.73	174	26.73	134.3	3.47	2.82	1471.
200	4.45	33.78	199	26.80	128.0	3.80	3.45	1470.
225	4.18	33.82	223	26.85	122.6	4.12	4.13	1470.
250	3.93	33.84	248	26.90	118.8	4.42	4.86	1469.
300	4.07	33.93	298	26.95	113.9	5.00	6.49	1471.


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NØ. 72 - 4 - 26
50-0.0 N 145-0.0 W
MØ.-6 DAY-2 GMT-18.2
31
32
33
34
35
SALINITY, 0/00

CFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 26   DATE 2/ 6/72
POSITION 50- 0.0N. 145- 0.0W   GMT 18.2
RESULTS OF STP CAST   193 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.86	32.65	0	25.61	238.4	0.0	0.0	1475.
10	6.84	32.65	10	25.62	238.5	0.24	0.01	1476.
20	6.80	32.65	20	25.62	238.1	0.48	0.05	1475.
30	6.62	32.65	30	25.64	236.1	0.71	0.11	1475.
50	4.55	32.67	50	25.90	211.3	1.16	0.29	1467.
75	4.19	32.72	75	25.98	204.2	1.68	0.62	1466.
100	4.09	32.75	99	26.01	201.1	2.19	1.07	1466.
125	3.87	32.77	124	26.05	197.7	2.69	1.64	1465.
150	4.40	33.35	149	26.46	159.6	3.14	2.28	1469.
175	4.39	33.67	174	26.71	135.9	3.51	2.88	1470.
200	4.54	33.77	199	26.78	130.0	3.84	3.52	1471.
225	4.25	33.80	223	26.83	124.9	4.16	4.21	1470.
250	4.09	33.83	248	26.87	121.2	4.47	4.96	1470.
300	3.93	33.92	298	26.96	113.1	5.05	6.59	1470.
400	3.93	34.04	397	27.06	104.8	6.13	10.45	1472.
500	3.65	34.13	496	27.15	96.4	7.14	15.05	1472.
600	3.49	34.19	595	27.22	90.6	8.07	20.28	1473.
800	3.14	34.31	793	27.35	79.3	9.77	32.33	1475.
1000	2.85	34.40	990	27.44	71.2	11.27	46.06	1478.
1200	2.61	34.45	1188	27.51	65.4	12.63	61.33	1480.


TEMPERATURE, C
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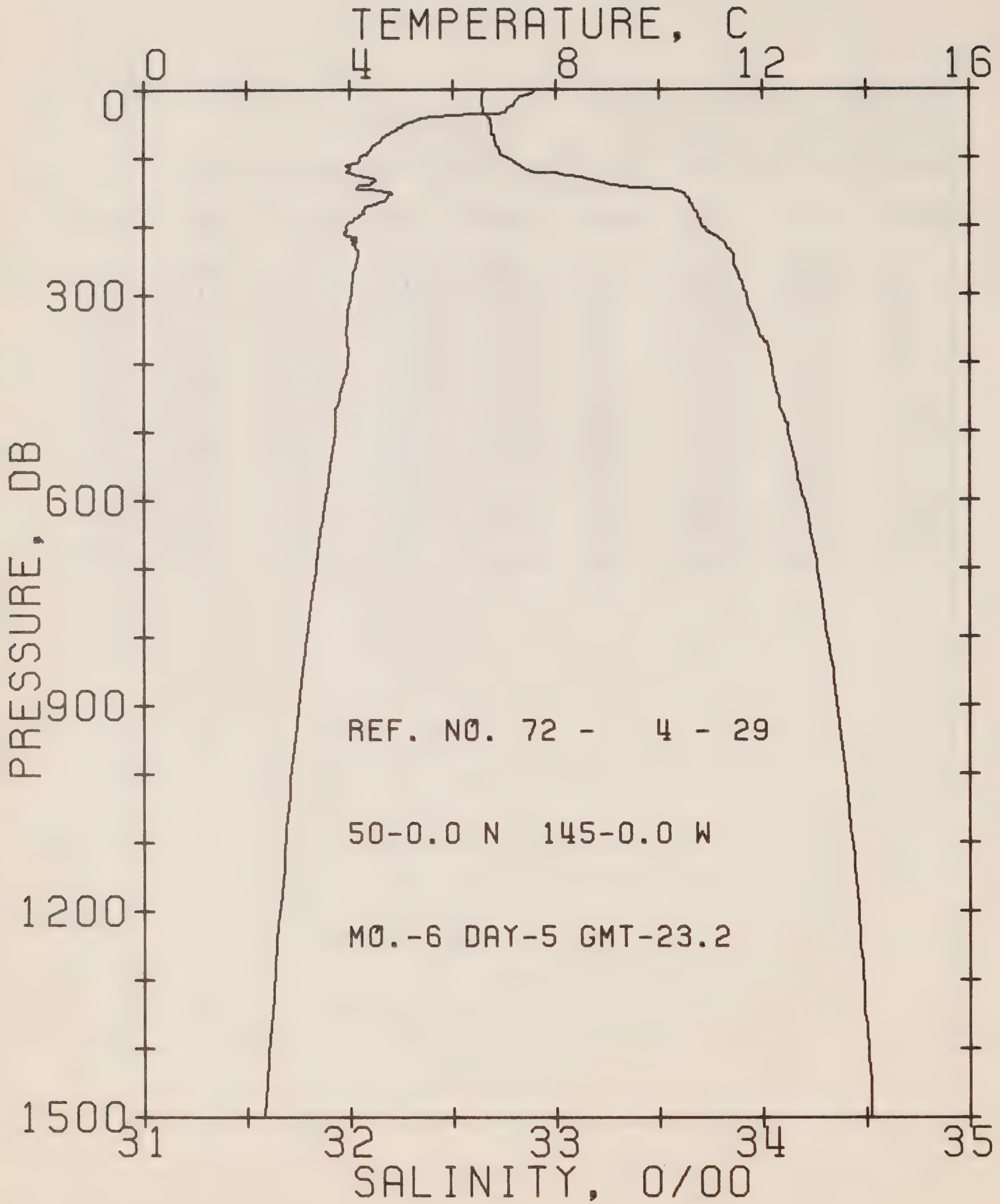
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 4 - 28
50-0.0 N 145-0.0 W
MO.-6 DAY-4 GMT-20.0
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 28   DATE 4/ 6/72
POSITION 50- 0.0N, 145- 0.0W   GMT 20.0
RESULTS OF STP CAST   147 POINTS TAKEN FROM ANALOG TRACE

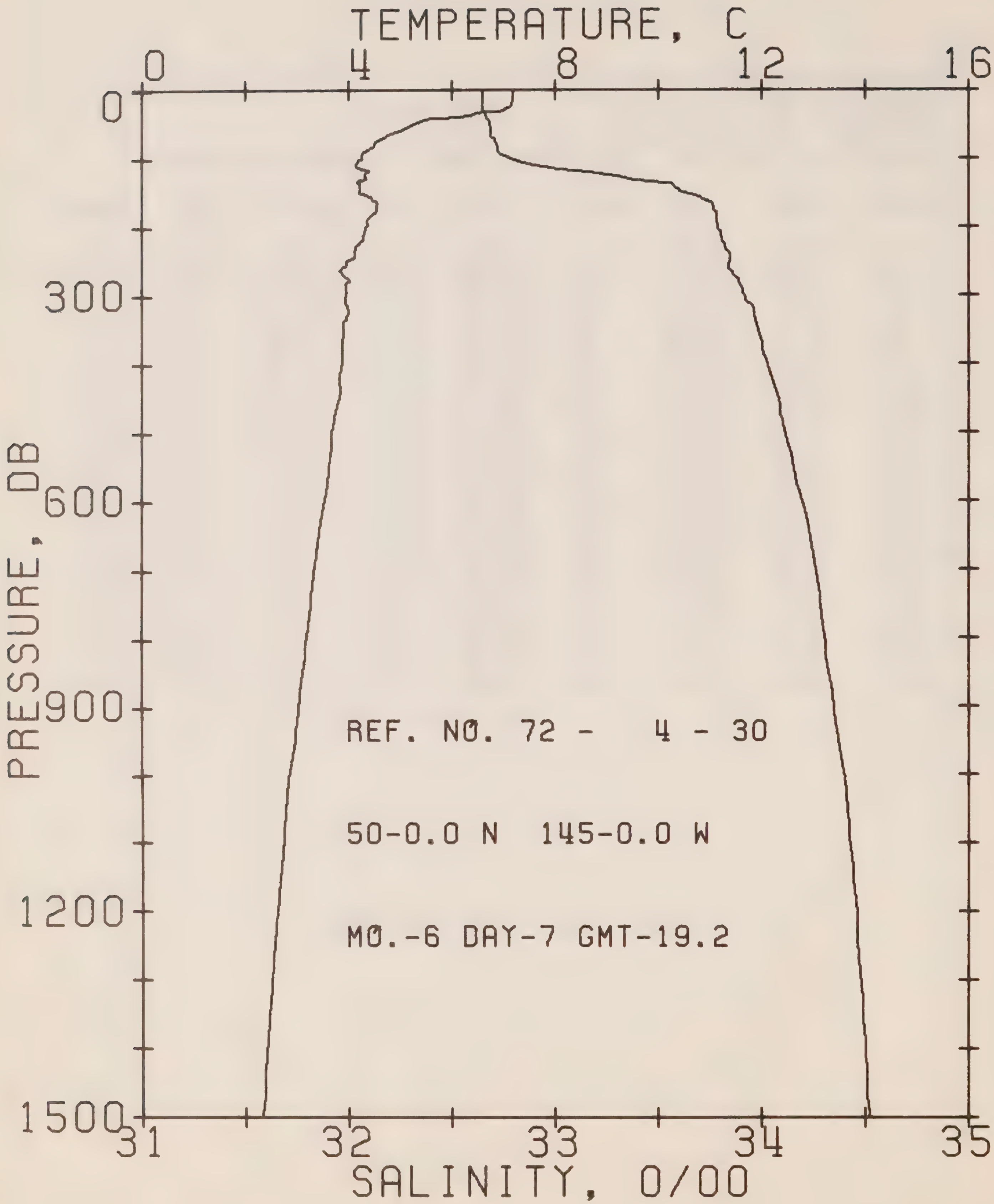
PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.07	32.64	0	25.58	241.8	0.0	0.0	1476.
10	7.05	32.65	10	25.59	241.3	0.24	0.01	1476.
20	7.02	32.65	20	25.59	240.9	0.48	0.05	1476.
30	6.97	32.64	30	25.59	241.2	0.72	0.11	1476.
50	5.14	32.64	50	25.82	219.7	1.19	0.30	1469.
75	4.66	32.67	75	25.89	212.6	1.73	0.64	1468.
100	4.37	32.70	99	25.95	207.7	2.25	1.11	1467.
125	4.26	32.93	124	26.14	189.2	2.76	1.69	1467.
150	4.85	33.57	149	26.58	147.9	3.17	2.26	1471.
175	4.31	33.66	174	26.72	135.2	3.53	2.85	1469.
200	4.24	33.74	199	26.78	129.1	3.85	3.48	1469.
225	4.16	33.82	223	26.86	122.5	4.17	4.16	1470.
250	4.14	33.86	248	26.89	119.5	4.47	4.89	1470.
300	4.04	33.90	298	26.93	115.6	5.06	6.54	1470.



TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 4 - 29
50-0.0 N 145-0.0 W
MO.-6 DAY-5 GMT-23.2
31
32
33
34
35
SALINITY, 0/00

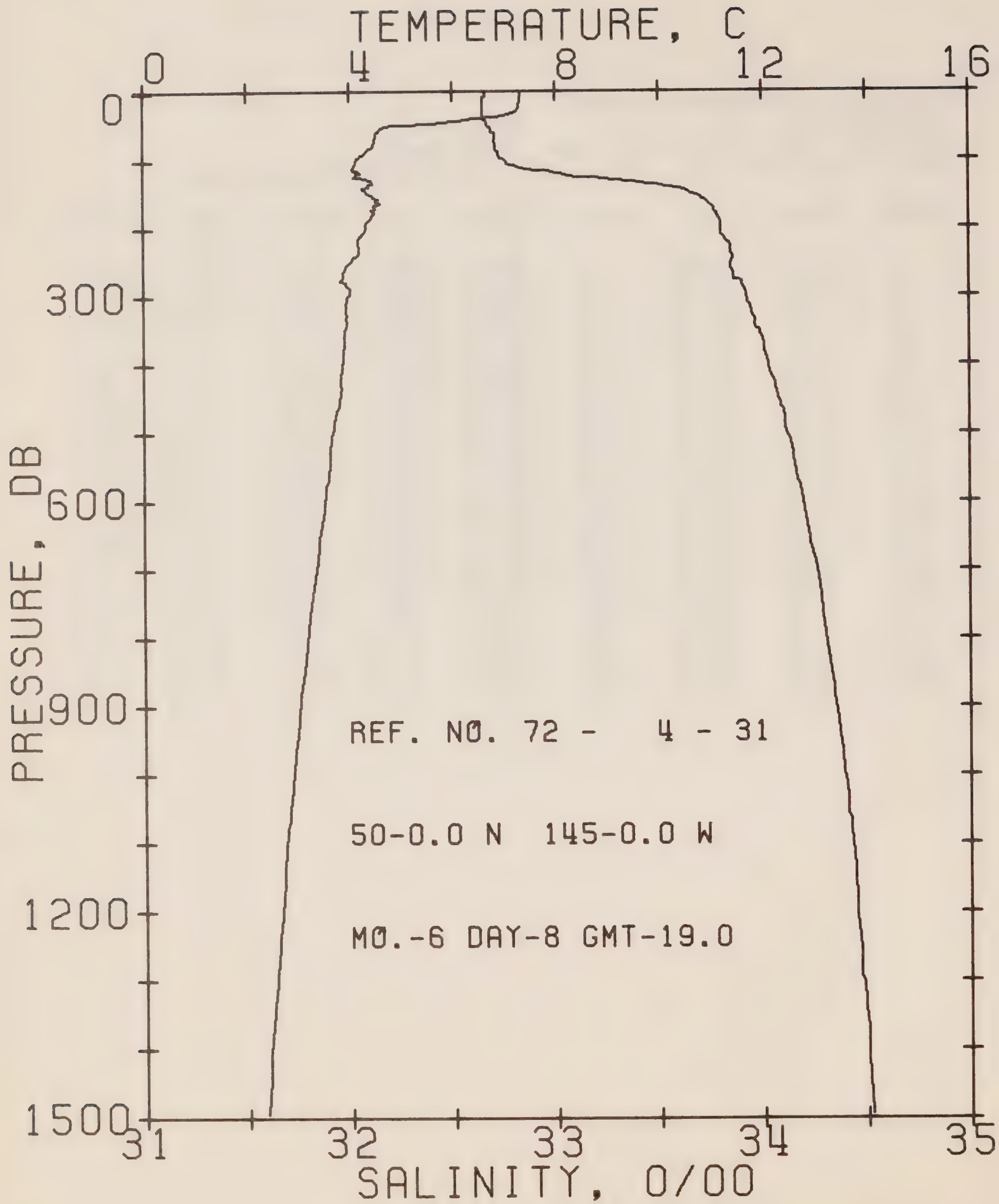
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 29 DATE 5/ 6/72
POSITION 50- 0.0N. 145- 0.0W GMT 23.2
RESULTS OF STP CAST 209 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.56	32.65	0	25.52	247.4	0.0	0.0	1478.
10	7.30	32.64	10	25.55	245.2	0.25	0.01	1477.
20	7.20	32.64	20	25.56	243.9	0.49	0.05	1477.
30	7.04	32.65	30	25.59	241.2	0.73	0.11	1477.
50	5.10	32.68	50	25.85	216.4	1.19	0.30	1469.
75	4.60	32.70	75	25.92	209.8	1.72	0.64	1468.
100	4.18	32.76	99	26.01	201.2	2.24	1.09	1466.
125	4.11	33.04	124	26.24	179.7	2.72	1.65	1467.
150	4.78	33.61	149	26.62	144.1	3.13	2.22	1471.
175	4.28	33.67	174	26.73	134.5	3.48	2.80	1469.
200	3.93	33.71	199	26.79	128.2	3.81	3.43	1468.
225	4.07	33.82	223	26.86	121.8	4.13	4.11	1469.
250	4.12	33.86	248	26.89	119.2	4.43	4.84	1470.
300	4.02	33.92	298	26.95	114.2	5.01	6.47	1470.
400	3.96	34.04	397	27.05	105.3	6.11	10.37	1472.
500	3.70	34.12	496	27.14	97.4	7.12	15.01	1473.
600	3.51	34.20	595	27.22	90.3	8.06	20.28	1474.
800	3.14	34.31	793	27.35	79.6	9.75	32.31	1475.
1000	2.85	34.40	990	27.44	71.2	11.26	46.08	1478.
1200	2.62	34.46	1188	27.51	65.3	12.62	61.36	1480.


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 4 - 30
50-0.0 N 145-0.0 W
MO.-6 DAY-7 GMT-19.2
31
32
33
34
35
SALINITY, 0/00

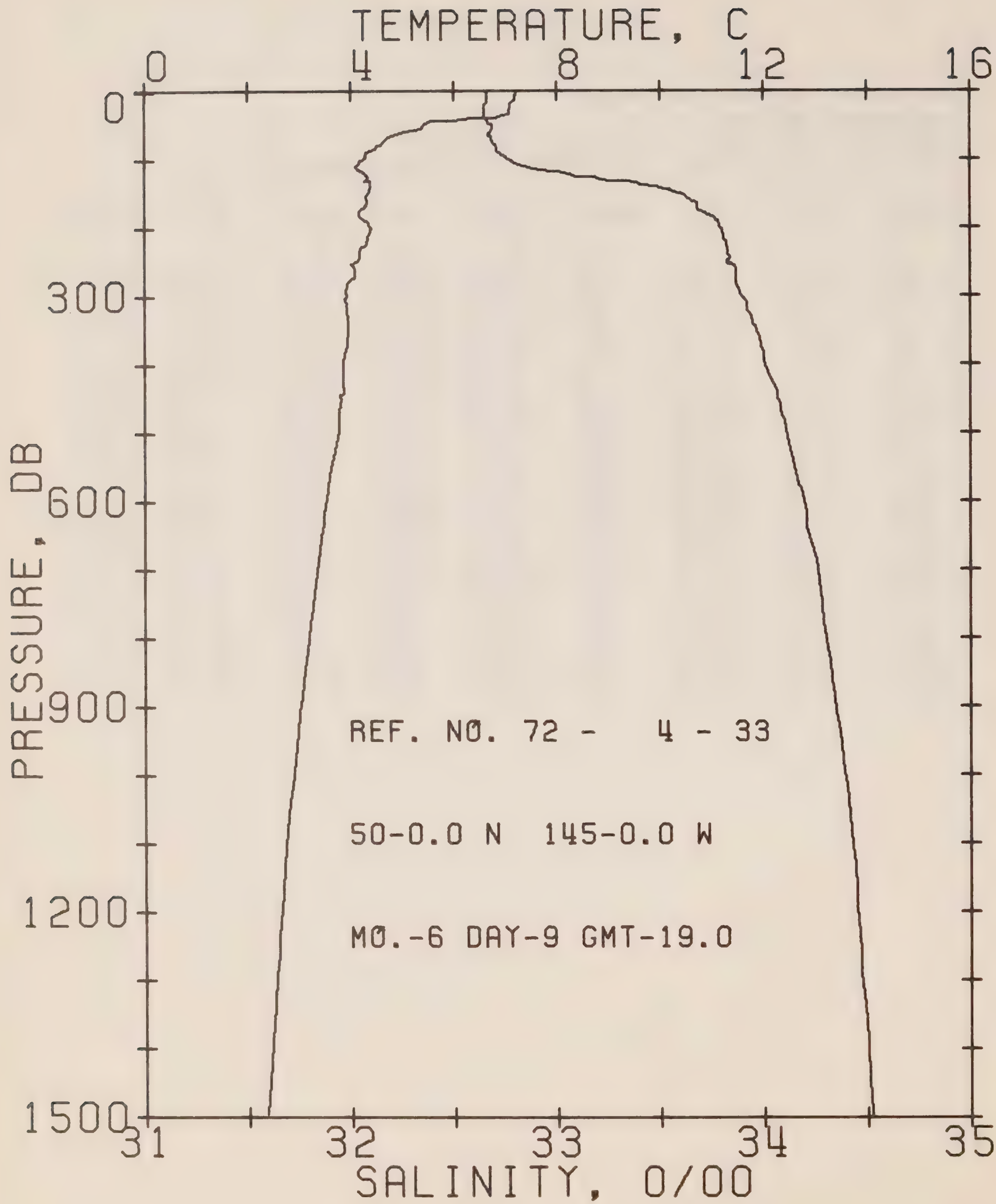
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 30 DATE 7/ 6/72
POSITION 50- 0.0N, 145- 0.0W GMT 19.2
RESULTS OF STP CAST 193 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.19	32.65	0	25.57	242.6	0.0	0.0	1477.
10	7.17	32.65	10	25.57	242.7	0.24	0.01	1477.
20	7.16	32.65	20	25.57	242.7	0.49	0.05	1477.
30	6.99	32.65	30	25.60	240.6	0.73	0.11	1476.
50	5.31	32.68	50	25.83	218.7	1.18	0.30	1470.
75	4.57	32.71	75	25.93	208.7	1.72	0.64	1467.
100	4.26	32.78	99	26.03	200.2	2.23	1.09	1467.
125	4.31	33.30	124	26.43	162.2	2.69	1.62	1468.
150	4.20	33.62	149	26.69	137.2	3.06	2.14	1468.
175	4.54	33.77	174	26.78	129.8	3.39	2.68	1470.
200	4.34	33.79	199	26.81	126.5	3.71	3.30	1470.
225	4.19	33.82	223	26.85	123.0	4.03	3.97	1470.
250	3.99	33.85	248	26.90	118.7	4.33	4.70	1469.
300	3.95	33.91	298	26.95	113.9	4.91	6.33	1470.
400	3.85	34.02	397	27.05	105.3	6.00	10.22	1471.
500	3.66	34.11	496	27.14	97.7	7.01	14.86	1472.
600	3.51	34.19	595	27.22	90.8	7.96	20.15	1473.
800	3.17	34.30	793	27.34	80.5	9.66	32.24	1475.
1000	2.85	34.40	990	27.44	71.3	11.18	46.19	1478.
1200	2.62	34.46	1188	27.51	65.4	12.55	61.51	1480.


TEMPERATURE, C
0
4
8
12
16
PRESSURE, DB
0
300
600
900
1200
1500
REF. NØ. 72 - 4 - 31
50-0.0 N 145-0.0 W
MØ.-6 DAY-8 GMT-19.0
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 31 DATE 8/ 6/72
POSITION 50- 0.0N. 145- 0.0W GMT 19.0
RESULTS OF STP CAST 200 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	PCT. EN	SOUND
0	7.32	32.65	0	25.55	244.3	0.0	0.0	1477.
10	7.30	32.65	10	25.55	244.4	0.24	0.01	1477.
20	7.28	32.65	20	25.56	244.2	0.49	0.05	1477.
30	7.23	32.65	30	25.56	243.7	0.73	0.11	1477.
50	5.13	32.67	50	25.84	217.4	1.20	0.30	1469.
75	4.46	32.71	75	25.95	207.6	1.72	0.64	1467.
100	4.13	32.74	99	26.00	202.1	2.24	1.09	1466.
125	4.09	33.11	124	26.30	174.3	2.72	1.64	1467.
150	4.34	33.66	149	26.71	135.7	3.10	2.17	1469.
175	4.49	33.77	174	26.78	129.2	3.43	2.72	1470.
200	4.30	33.80	199	26.83	125.3	3.74	3.32	1470.
225	4.17	33.84	223	26.87	120.8	4.05	3.99	1470.
250	4.01	33.86	248	26.90	118.4	4.35	4.71	1469.
300	3.97	33.92	298	26.96	113.7	4.93	6.34	1470.
400	3.84	34.03	397	27.06	104.9	6.02	10.22	1471.
500	3.65	34.12	496	27.14	97.2	7.03	14.85	1472.
600	3.51	34.19	595	27.22	90.8	7.97	20.09	1474.
800	3.15	34.31	793	27.34	80.0	9.67	32.18	1475.
1000	2.87	34.39	990	27.44	71.9	11.18	46.05	1478.
1200	2.64	34.45	1188	27.50	66.1	12.55	61.40	1480.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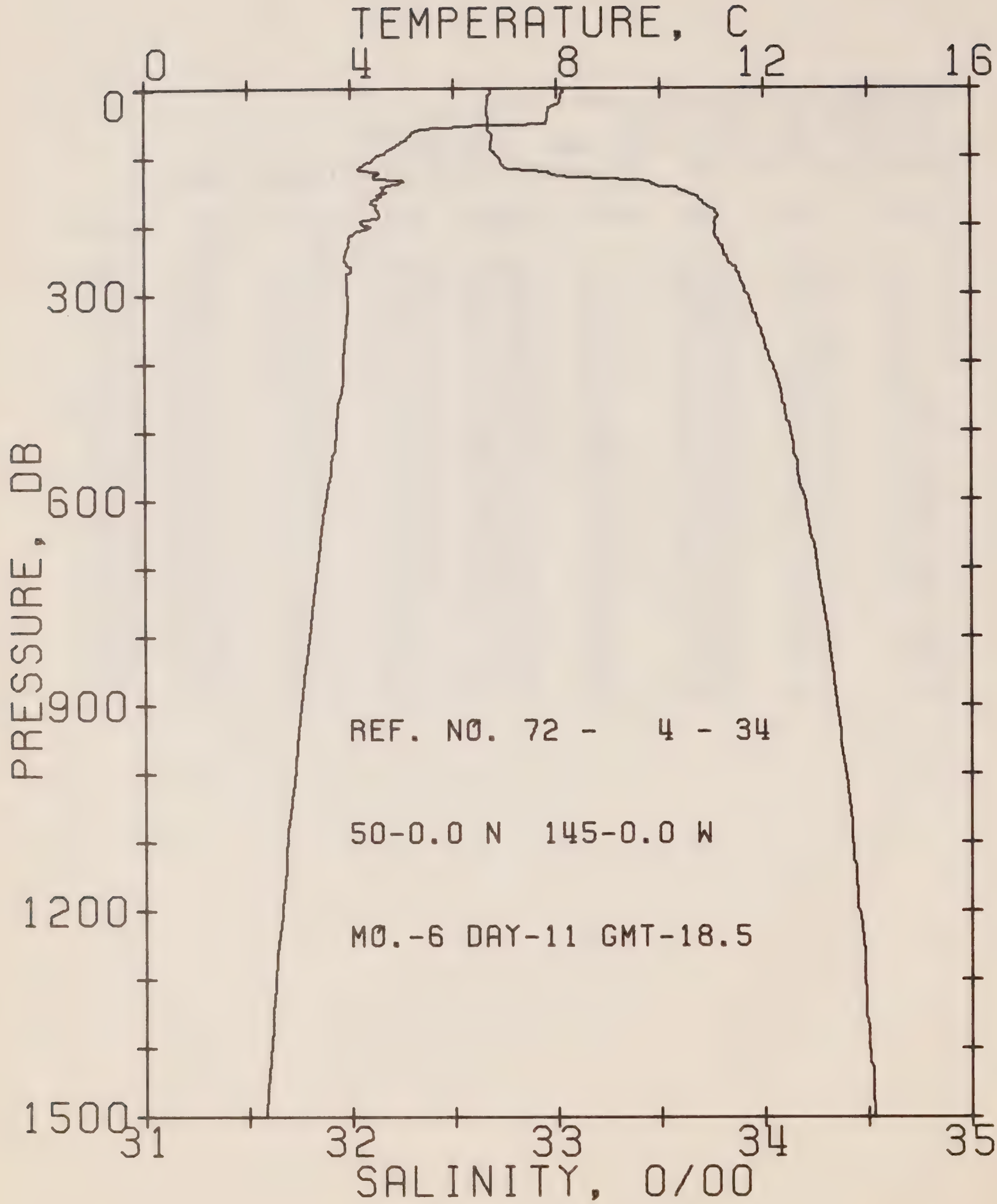
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NØ. 72 - 4 - 33
50-0.0 N 145-0.0 W
MØ.-6 DAY-9 GMT-19.0
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 33 DATE 9/ 6/72
POSITION 50- 0.0N, 145- 0.0W GMT 19.0
RESULTS OF STP CAST 214 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.20	32.65	0	25.57	242.7	0.0	0.0	1477.
10	7.18	32.66	10	25.58	242.1	0.24	0.01	1477.
20	7.10	32.65	20	25.58	241.9	0.48	0.05	1477.
30	7.09	32.65	30	25.58	241.9	0.73	0.11	1477.
50	5.42	32.68	50	25.82	219.5	1.19	0.30	1470.
75	4.63	32.69	75	25.91	211.1	1.73	0.64	1468.
100	4.25	32.76	99	26.01	201.7	2.25	1.10	1467.
125	4.34	33.09	124	26.26	178.3	2.73	1.65	1468.
150	4.33	33.59	149	26.66	140.8	3.12	2.19	1469.
175	4.16	33.69	174	26.75	131.8	3.46	2.76	1469.
200	4.38	33.79	199	26.81	126.8	3.78	3.37	1470.
225	4.29	33.82	223	26.84	123.9	4.09	4.05	1470.
250	4.11	33.83	248	26.87	121.4	4.39	4.78	1470.
300	3.91	33.89	298	26.94	115.1	4.98	6.43	1470.
400	3.85	34.00	397	27.03	106.9	6.09	10.37	1471.
500	3.74	34.11	496	27.13	98.5	7.11	15.05	1473.
600	3.51	34.19	595	27.22	90.7	8.06	20.35	1473.
800	3.18	34.30	793	27.33	80.7	9.76	32.50	1476.
1000	2.87	34.39	990	27.44	71.9	11.28	46.42	1478.
1200	2.63	34.45	1188	27.50	66.0	12.65	61.72	1480.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4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NØ. 72 - 4 - 34
50-0.0 N 145-0.0 W
MØ.-6 DAY-11 GMT-18.5
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 4- 34 DATE 11/ 6/72
POSITION 50- 0.0N, 145- 0.0W GMT 18.5
RESULTS OF STP CAST 220 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	PCT. EN	SOUND
0	8.11	32.68	0	25.46	252.7	0.0	0.0	1480.
10	8.09	32.67	10	25.46	253.3	0.25	0.01	1480.
20	8.04	32.67	20	25.46	253.0	0.51	0.05	1480.
30	7.83	32.66	30	25.49	251.0	0.76	0.12	1480.
50	7.78	32.67	50	25.50	249.9	1.26	0.32	1480.
75	5.09	32.69	75	25.86	215.7	1.82	0.68	1470.
100	4.49	32.71	99	25.94	207.8	2.36	1.15	1467.
125	4.53	32.97	124	26.15	188.9	2.86	1.73	1468.
150	4.63	33.61	149	26.64	142.5	3.26	2.29	1470.
175	4.47	33.74	174	26.76	131.1	3.60	2.85	1470.
200	4.28	33.76	199	26.80	127.7	3.92	3.47	1470.
225	3.95	33.78	223	26.85	123.1	4.24	4.15	1469.
250	3.86	33.82	248	26.89	119.3	4.54	4.88	1469.
300	3.92	33.91	298	26.96	113.6	5.12	6.51	1470.
400	3.85	34.03	397	27.06	104.6	6.21	10.39	1471.
500	3.71	34.13	496	27.15	97.0	7.22	15.00	1473.
600	3.50	34.20	595	27.22	90.4	8.16	20.27	1473.
800	3.18	34.31	793	27.34	80.2	9.86	32.38	1476.
1000	2.89	34.39	990	27.43	72.0	11.38	46.30	1478.
1200	2.64	34.45	1188	27.51	66.0	12.76	61.69	1480.

SURFACE TEMPERATURE AND SALINITY OBSERVATIONS

(P-72-4)

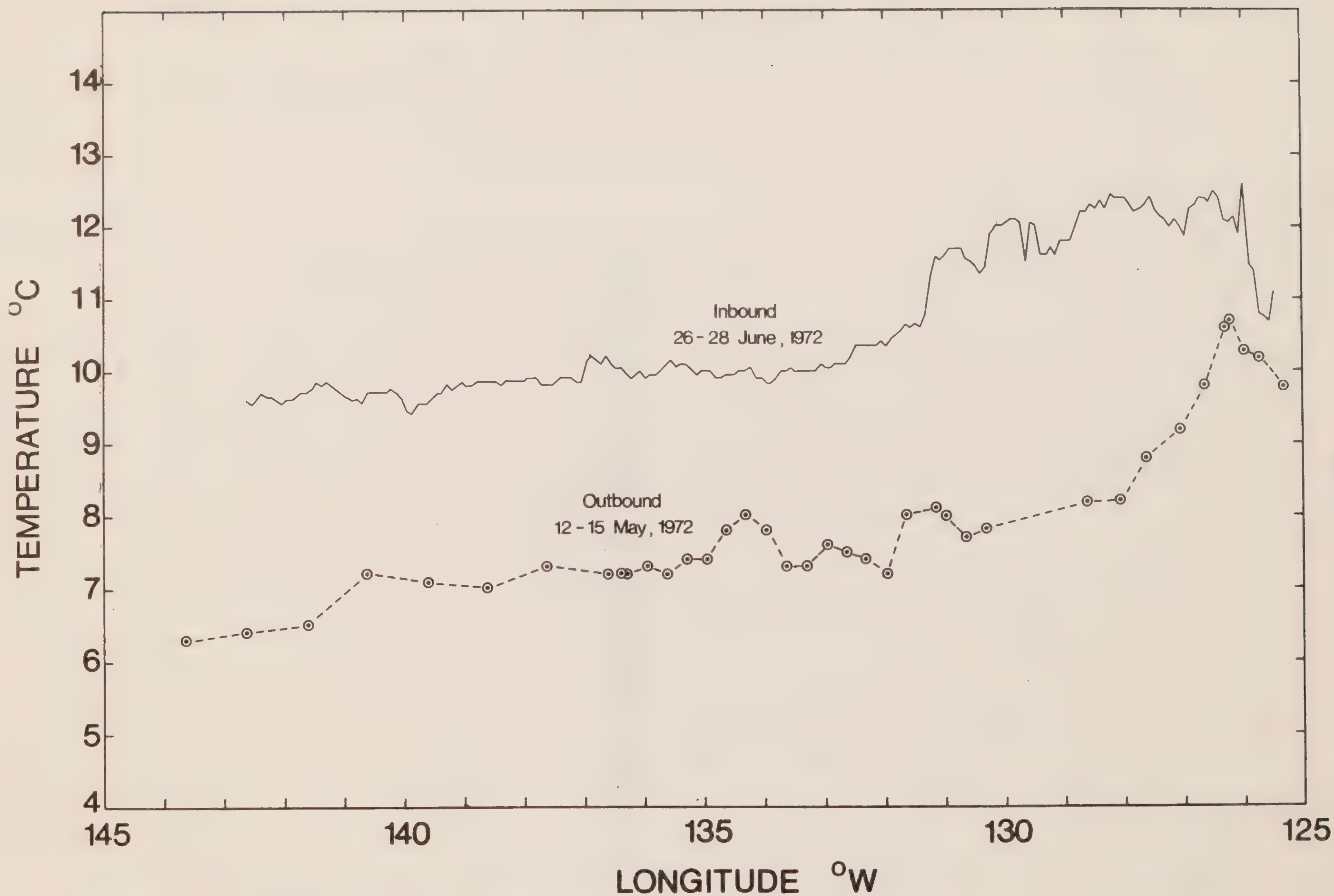


FIGURE 14 GRAPH OF LINE P SURFACE TEMPERATURES AS CONTINUOUSLY RECORDED FROM A PROBE LOCATED AT THE ENGINE ROOM INTAKE (APPROXIMATELY 3 METERS BELOW SURFACE) P-72-4. NOTE: OUTBOUND DATA TAKEN FROM XBT OBSERVATIONS AS RECORDER WAS INOPERABLE.

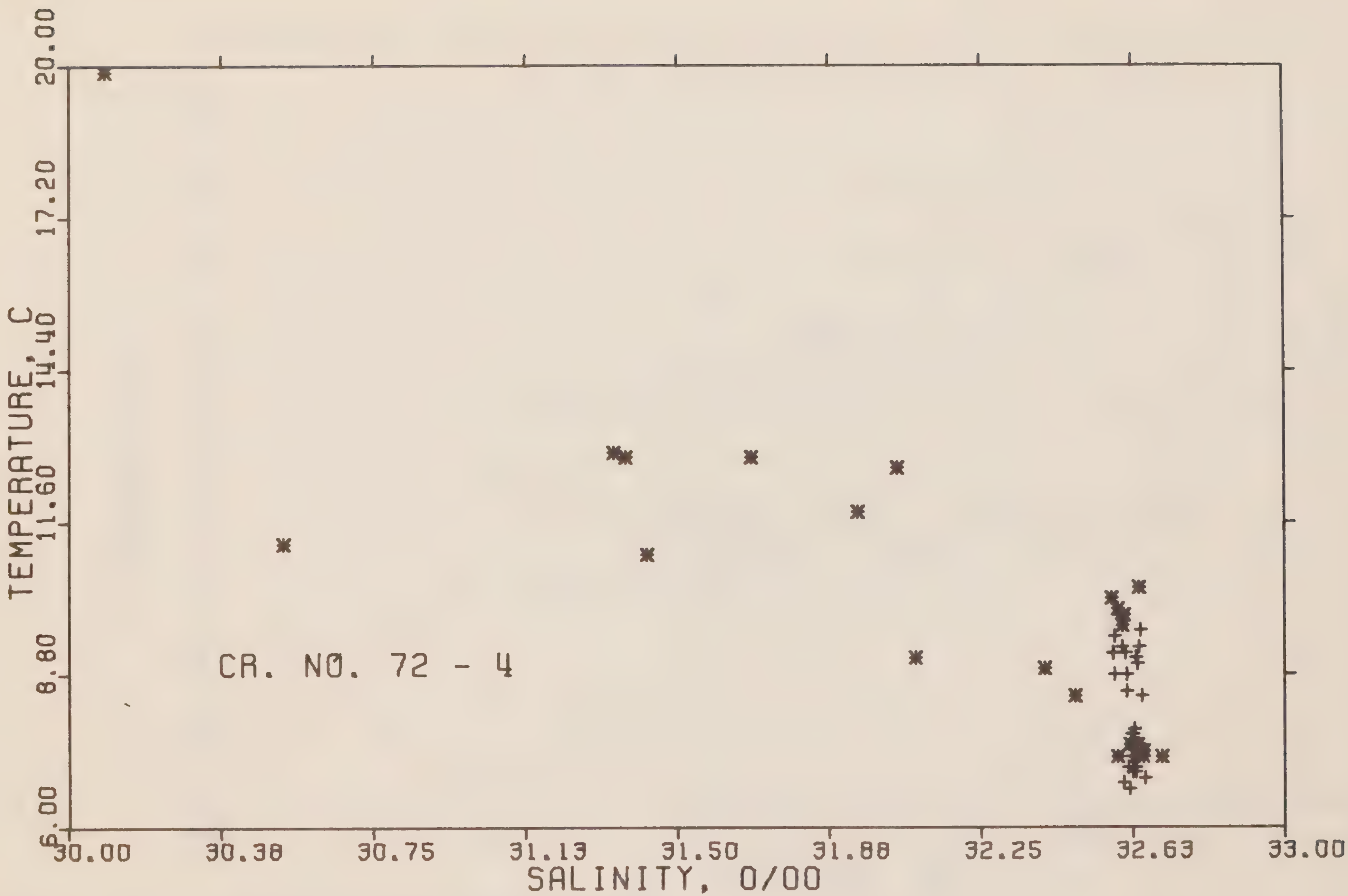


Figure 15 T-S plot of surface temperature and salinity observations on line P (asterisks) and at Station P (pluses) during cruise P-72-4.

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS
CRUISE REFERENCE NUMBER 72- 4

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DY	GMT	0/00	C	WEST
72	5	12	2234	30.091	19.9	125-33
72	5	13	8	31.424	11.0	126- 0
72	5	13	300	32.087	9.1	126-40
72	5	13	630	32.407	8.9	127-40
72	5	13	1227	32.483	8.4	128-40
72	5	13	1820	32.618	7.5	130-40
72	5	14	110	32.636	7.5	132-40
72	5	14	640	32.652	7.4	134-40
72	5	14	1355	32.588	7.3	136-40
72	5	14	2030	32.651	7.3	138-40
72	5	15	315	32.696	7.3	140-40
72	5	15	1145	32.656	6.9	142-40
72	5	16	0	32.634	7.0	145- 0
72	5	17	0	32.615	7.1	ON STATION
72	5	18	0	32.603	6.8	ON STATION
72	5	19	0	32.618	6.7	ON STATION
72	5	20	0	32.624	7.0	ON STATION
72	5	21	0	32.636	7.5	ON STATION
72	5	22	0	32.649	7.4	ON STATION
72	5	23	0	32.622	7.5	ON STATION
72	5	24	0	32.624	7.1	ON STATION
72	5	25	0	32.630	7.1	ON STATION
72	5	26	0	32.623	7.3	ON STATION
72	5	27	0	32.632	7.5	ON STATION
72	5	28	0	32.630	7.8	ON STATION
72	5	29	0	32.624	7.7	ON STATION
72	5	30	0	0.0	7.5	ON STATION
72	5	31	0	32.652	7.3	ON STATION
72	6	1	0	32.633	7.3	ON STATION
72	6	2	0	32.631	7.3	ON STATION
72	6	3	0	32.632	7.1	ON STATION
72	6	4	0	32.635	7.3	ON STATION
72	6	5	0	32.635	7.4	ON STATION
72	6	6	0	32.636	7.5	ON STATION
72	6	7	0	32.634	7.5	ON STATION
72	6	8	0	32.639	7.5	ON STATION
72	6	9	0	32.630	7.4	ON STATION
72	6	10	0	32.623	7.7	ON STATION
72	6	11	0	32.610	8.5	ON STATION
72	6	12	0	32.646	8.4	ON STATION
72	6	13	0	32.639	9.3	ON STATION
72	6	14	0	32.637	9.0	ON STATION
72	6	15	0	32.631	9.1	ON STATION
72	6	16	0	32.644	9.6	ON STATION
72	6	17	0	32.609	8.8	ON STATION

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS
CRUISE REFERENCE NUMBER 72- 4

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DY	GMT	0/00	C	WEST
72	6	17	0	32.609	8.8	ON STATION
72	6	18	0	0.0	9.4	ON STATION
72	6	19	0	32.606	9.2	ON STATION
72	6	20	0	32.600	9.3	ON STATION
72	6	21	0	32.579	8.8	ON STATION
72	6	22	0	32.577	9.2	ON STATION
72	6	23	0	32.577	9.2	ON STATION
72	6	24	0	32.579	9.5	ON STATION
72	6	25	0	32.578	9.2	145- 0
72	6	26	45	32.586	9.9	142-40
72	6	26	1015	32.600	9.7	140-40
72	6	26	1515	32.604	9.9	138-40
72	6	26	2000	32.639	10.4	136-40
72	6	27	230	32.589	10.0	134-40
72	6	27	715	32.572	10.2	132-40
72	6	27	1315	31.945	11.8	130-40
72	6	27	1930	32.044	12.6	128-40
72	6	27	2300	31.684	12.8	127-40
72	6	28	300	31.374	12.8	126-40
72	6	28	510	31.341	12.9	126- 0
72	6	28	735	30.528	11.2	125-33

OCEANOGRAPHIC DATA OBTAINED ON CRUISE P-72-5

(C.O.D.C. REFERENCE NO. 15-72-005)

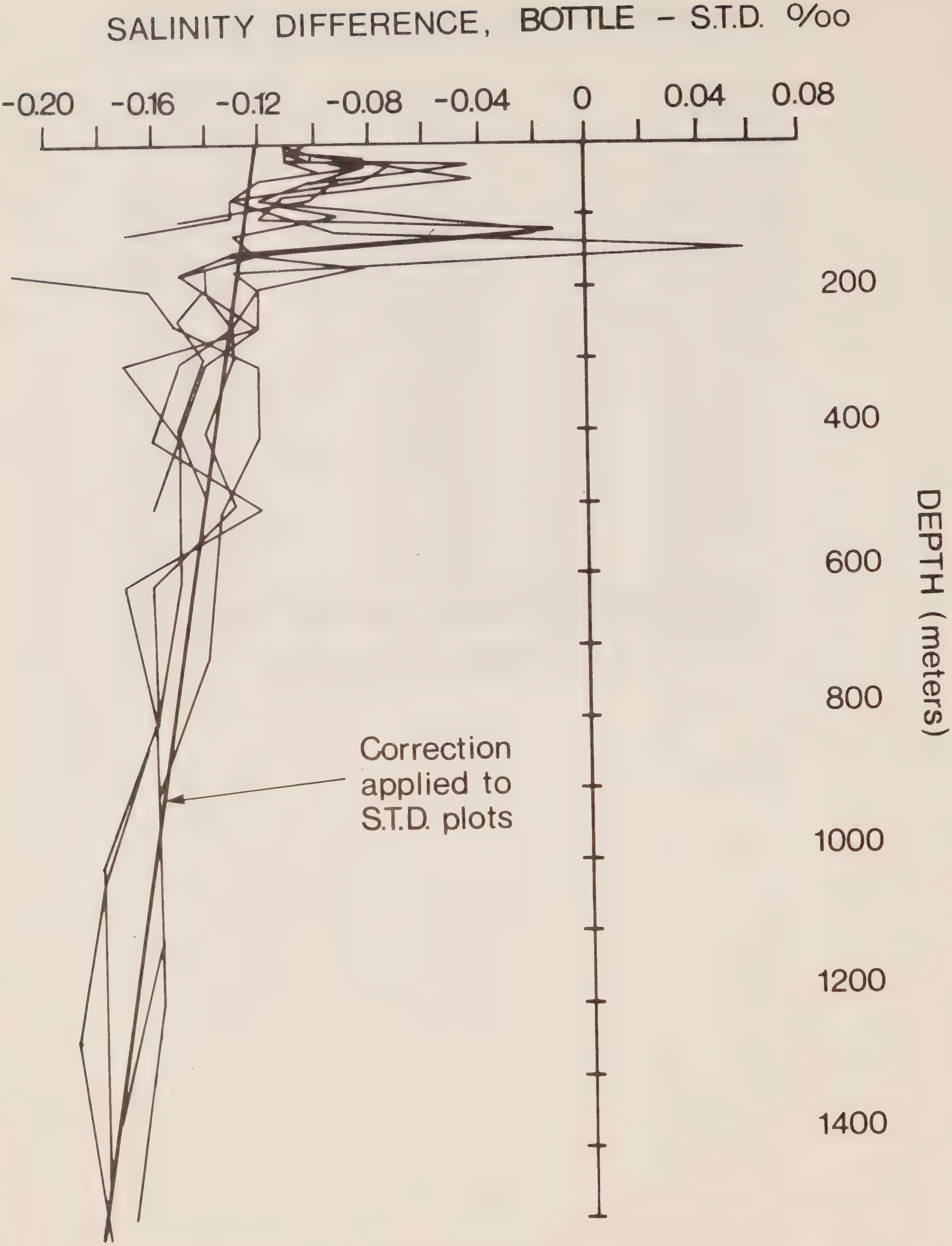


Figure 16 Bottle - STD salinity value difference profiles P-72-5.

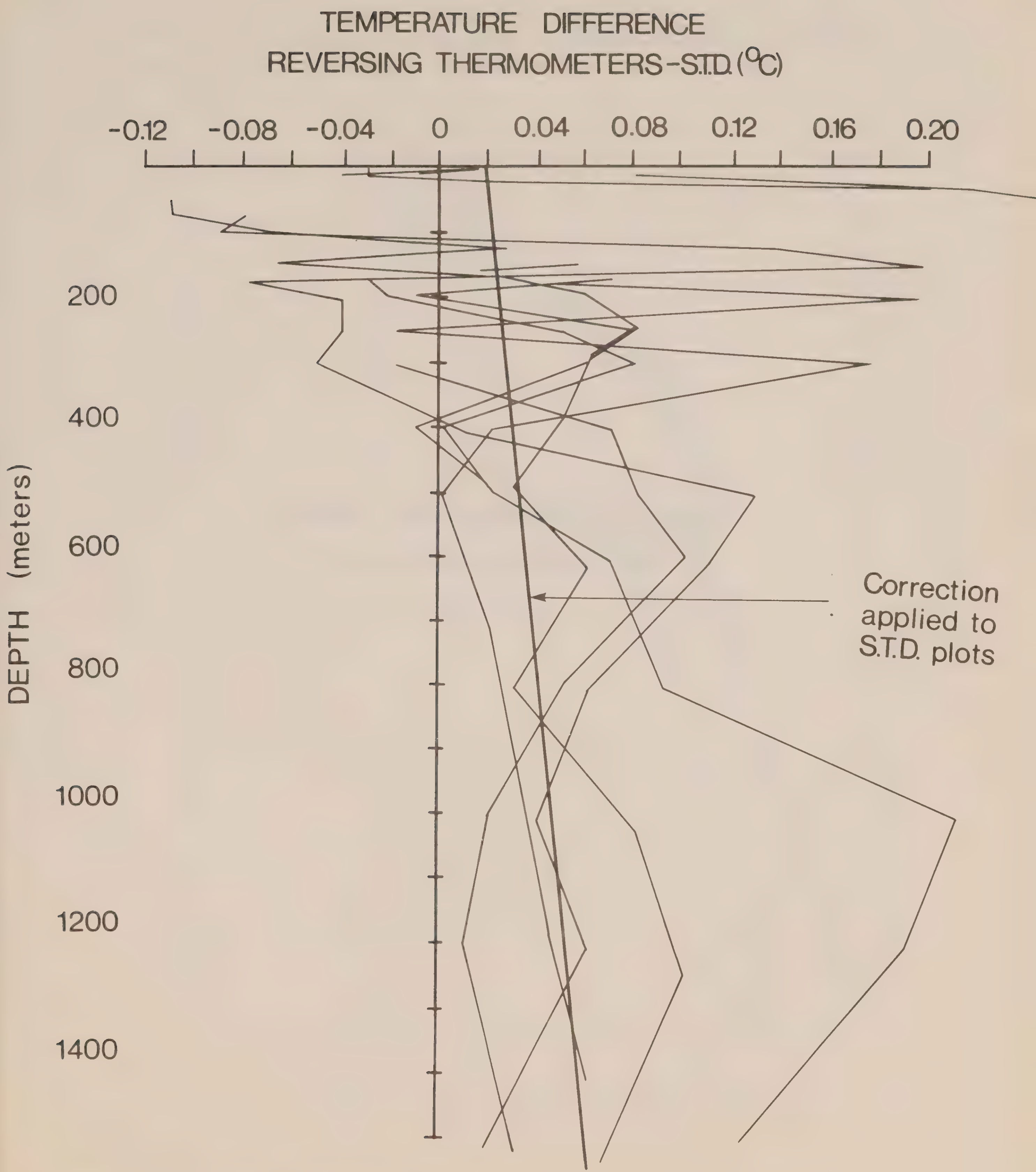


Figure 17 Reversing thermometer - STD temperature difference profiles P-72-5.

COMPOSITE PLOTS OF TEMPERATURE, SALINITY

AND DISSOLVED OXYGEN VS DEPTH

(P-72-5)

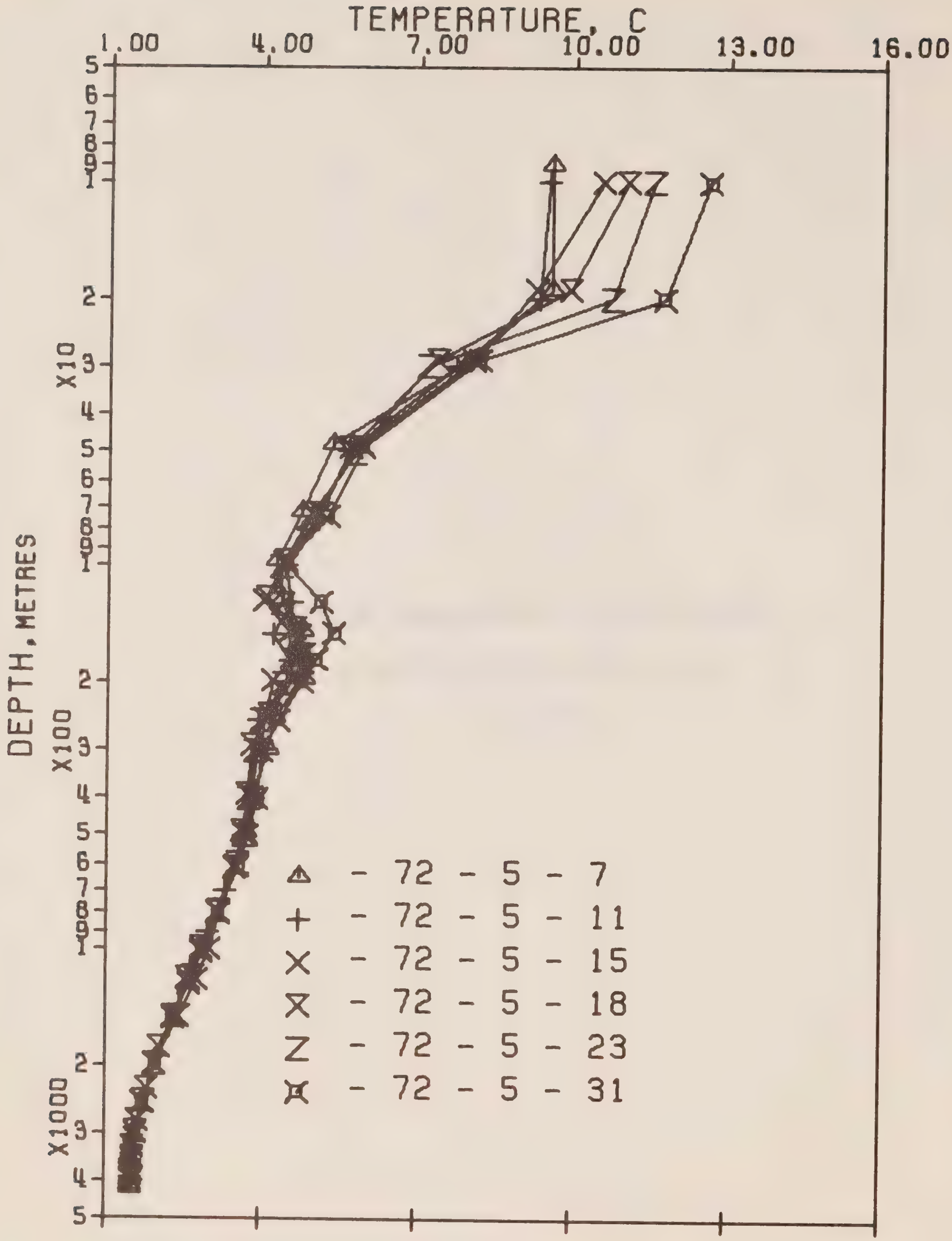


Figure 18 Composite plot of temperature vs $\log_{10}$ depth P-72-5.

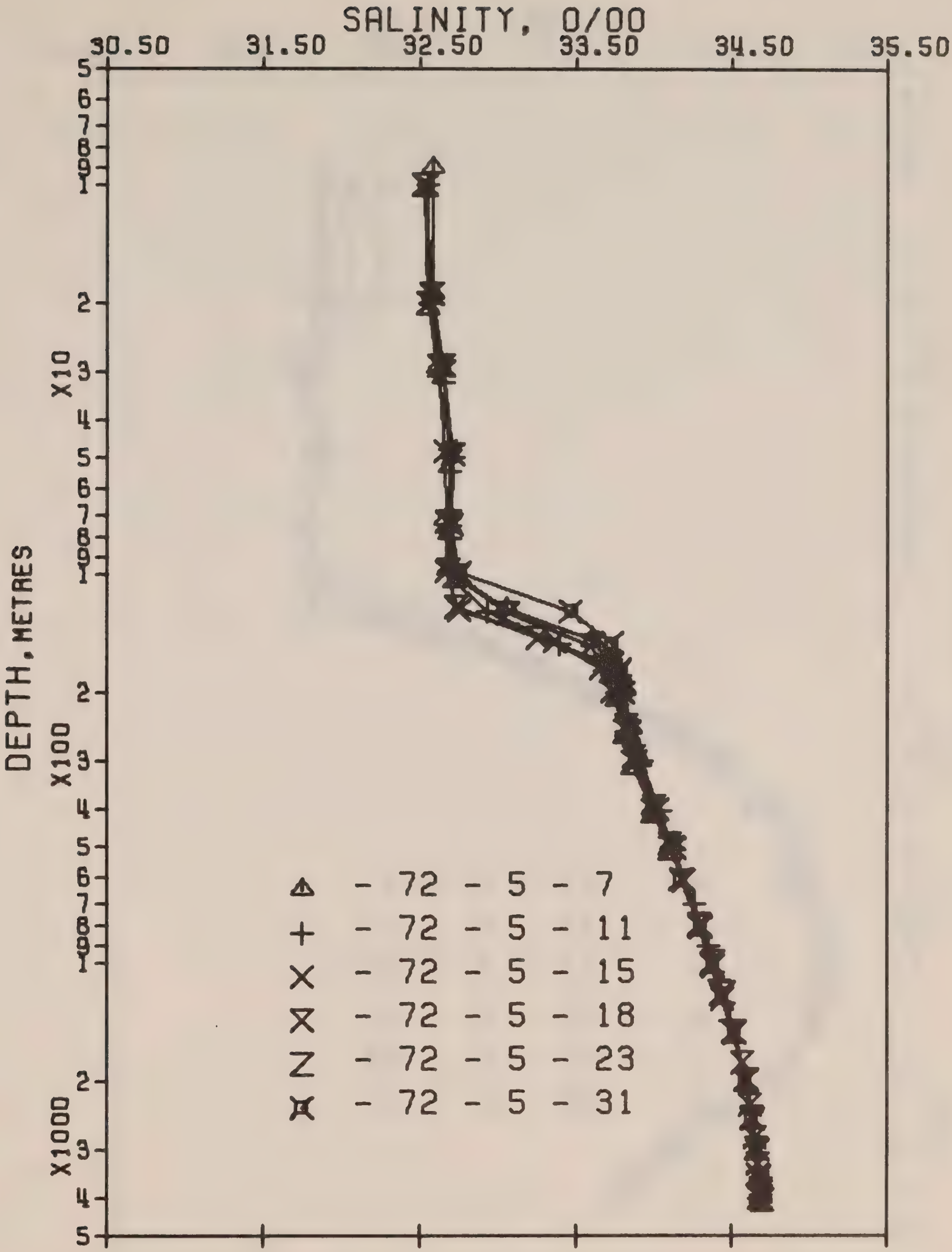


Figure 19 Composite plot of salinity vs $\log_{10}$ depth P-72-5.

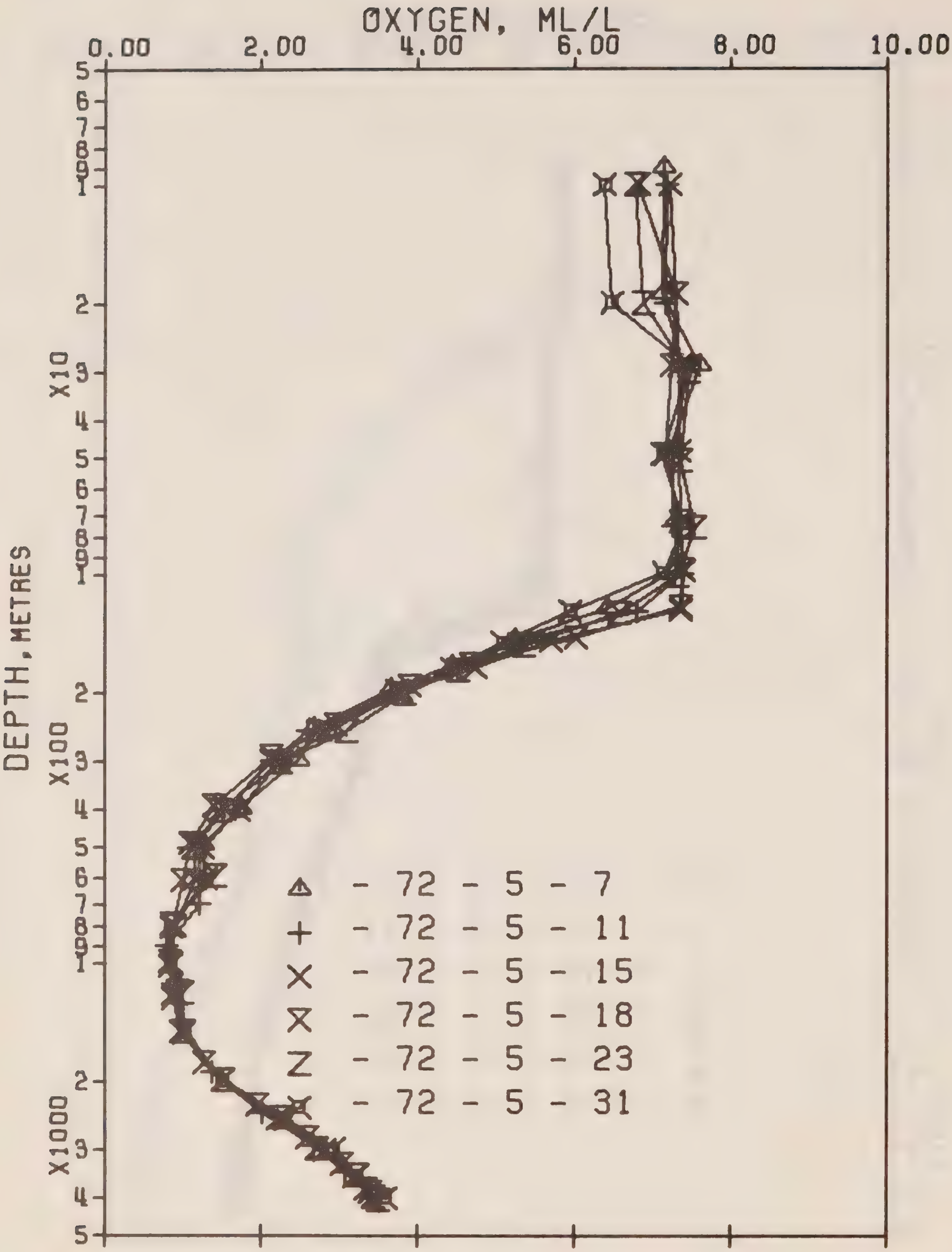
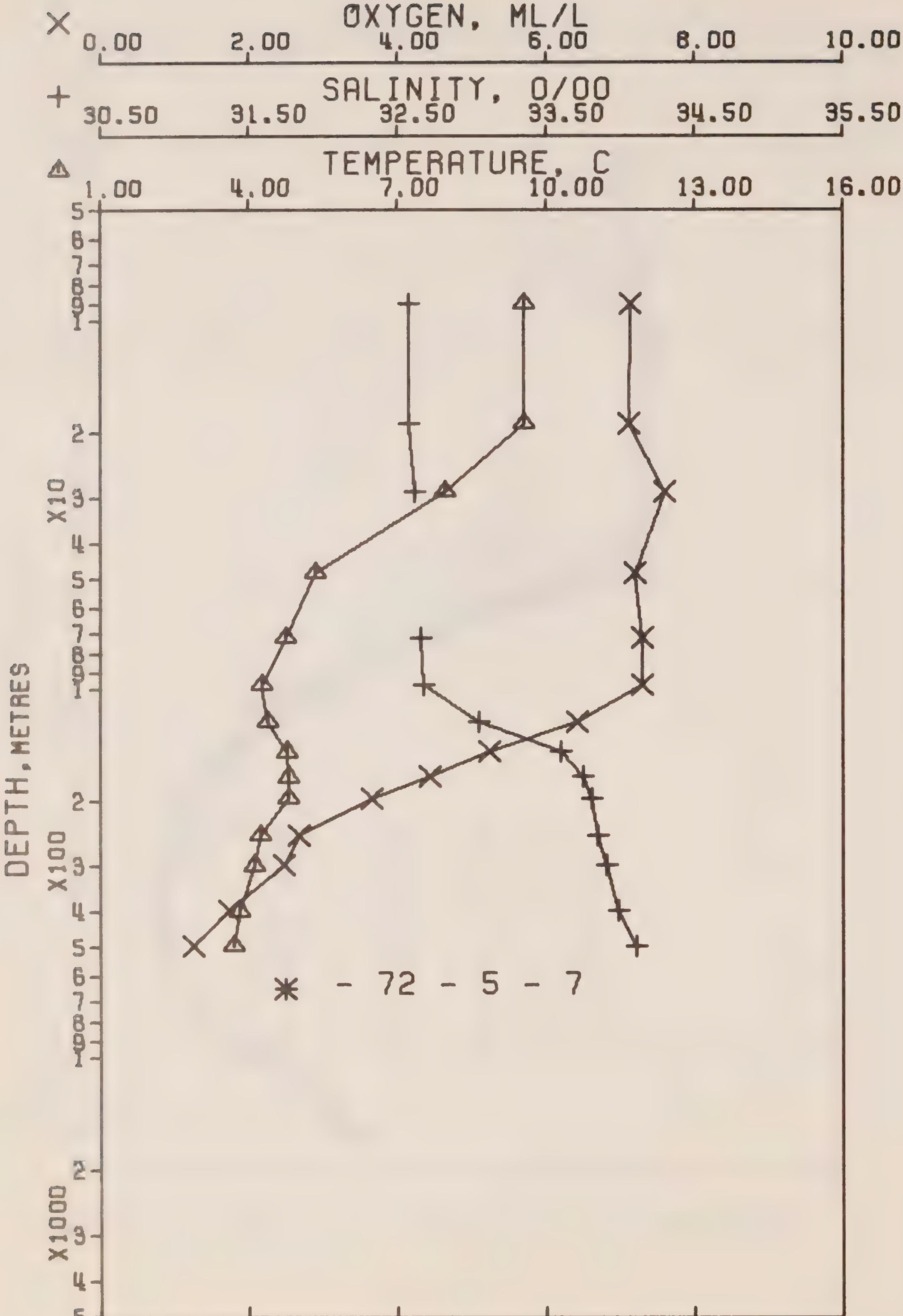


Figure 20 Composite plot of oxygen vs $\log_{10}$ depth P-72-5.

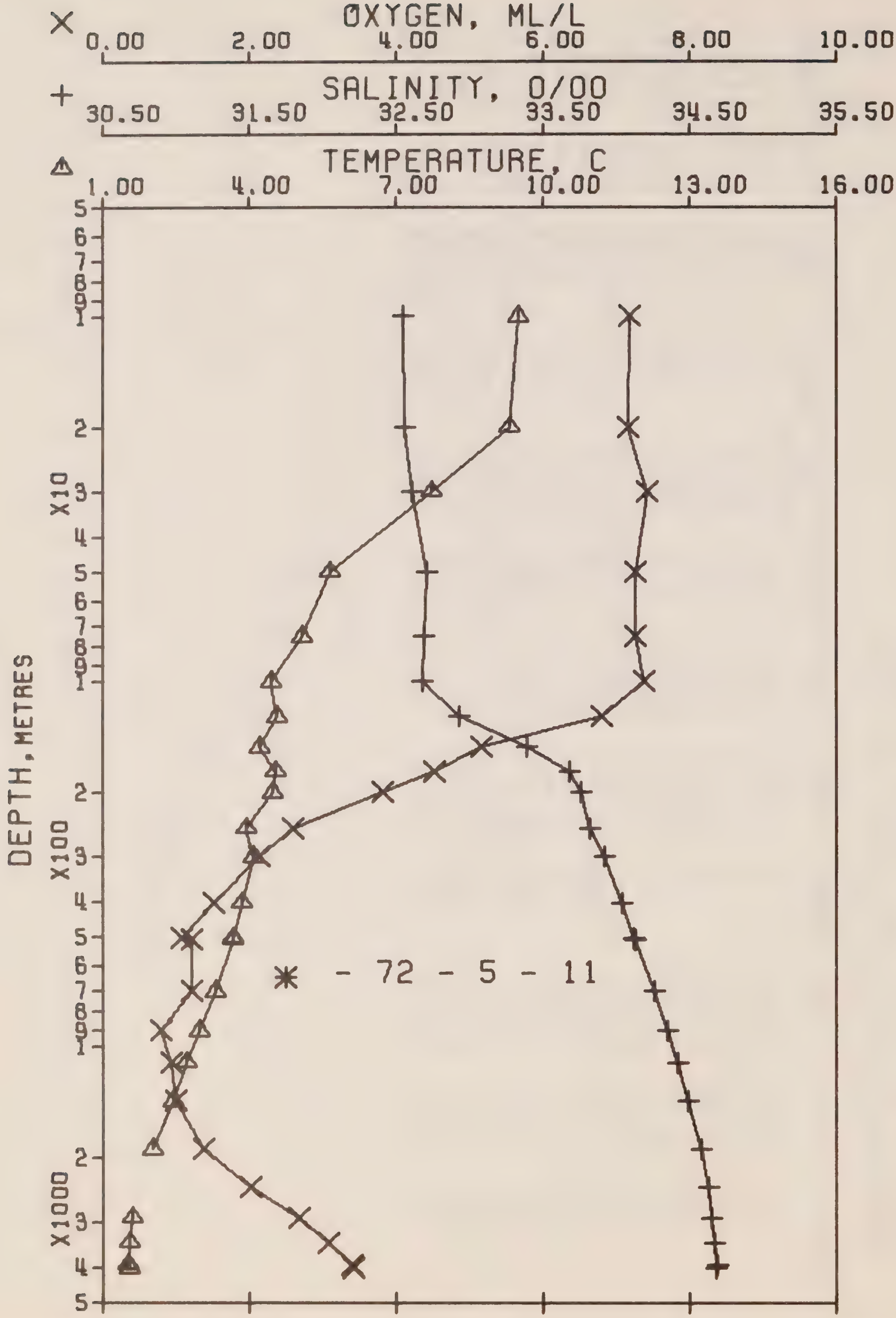
RESULTS OF BOTTLE CASTS

(P-72-5)


OXYGEN, ML/L
0.00
2.00
4.00
6.00
8.00
10.00
SALINITY, 0/00
30.50
31.50
32.50
33.50
34.50
35.50
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 5 - 7

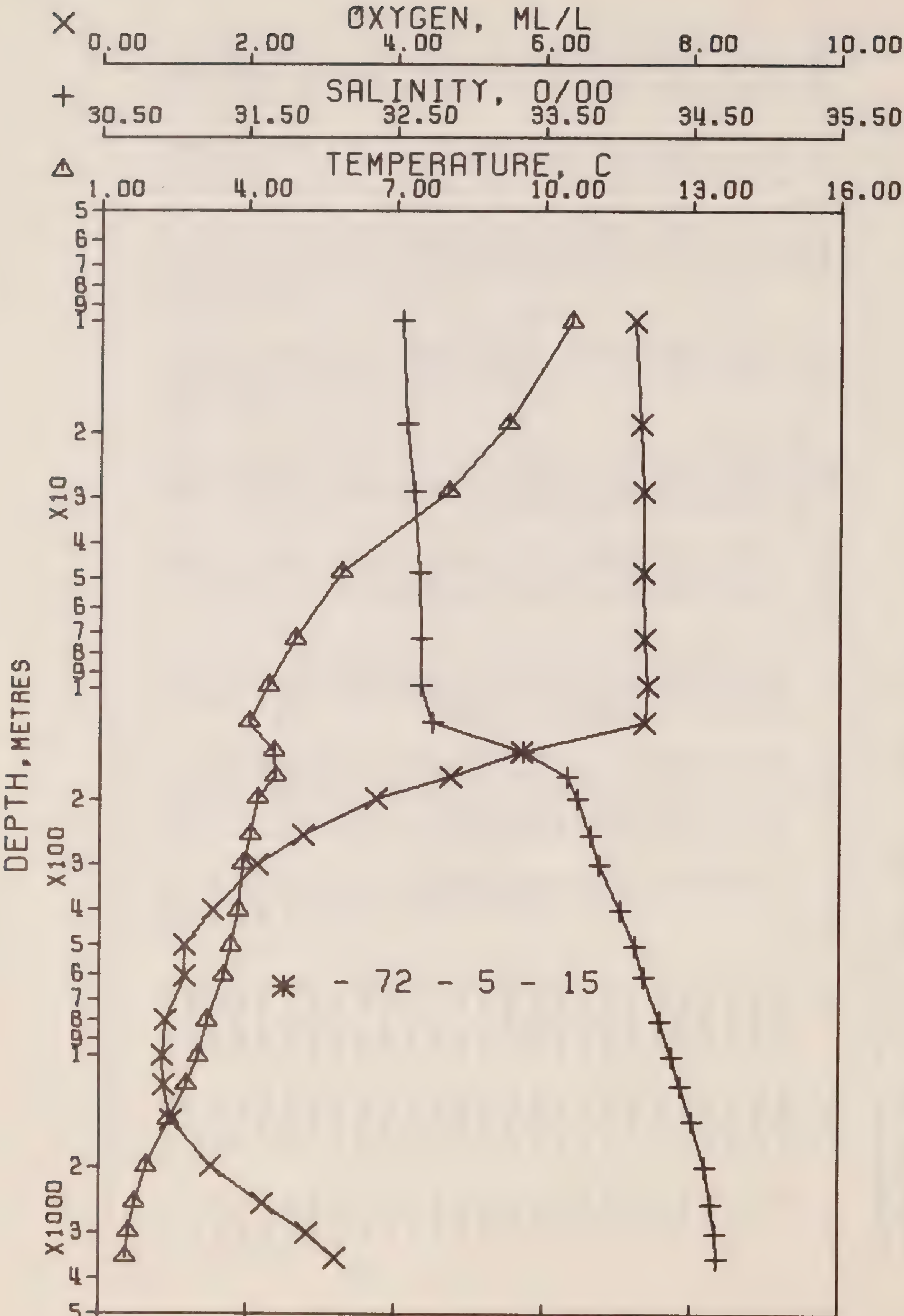
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 7 CATE 27/ 6/72
POSITION 50- 0.0 N. 145- 0.0 W GMT 18.2
HYDROGRAPHIC CAST CATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	9.59	32.592	0	25.165	281.2	9.59	281.0	0.0	0.0	7.09	1486.
9	9.56	32.583	9	25.163	281.6	9.56	281.2	0.25	0.01	7.14	1486.
19	9.56	32.582	19	25.162	281.8	9.56	281.3	0.54	0.05	7.13	1486.
29	7.97	32.621	29	25.436	255.9	7.97	255.1	0.81	0.12	7.59	1480.
48	5.35	32.654*	48	25.803	221.0	5.35	220.2	1.26	0.30	7.21	1470.
72	4.74	32.664	72	25.879	213.9	4.73	213.1	1.78	0.62	7.30	1468.
98	4.27	32.676	97	25.938	208.5	4.26	207.5	2.32	1.08	7.31	1466.
123	4.40	33.050	122	26.221	181.9	4.39	180.6	2.81	1.64	6.42	1468.
148	4.77	33.599	147	26.616	144.8	4.76	143.0	3.22	2.20	5.24	1471.
173	4.82	33.747	172	26.728	134.6	4.81	132.4	3.57	2.77	4.44	1471.
198	4.82	33.810	197	26.778	130.0	4.80	127.6	3.90	3.40	3.65	1472.
250	4.25	33.851	248	26.872	121.3	4.23	118.7	4.55	4.87	2.67	1470.
301	4.13	33.911	299	26.932	116.0	4.11	113.0	5.15	6.58	2.47	1471.
401	3.82	33.995	398	27.030	107.3	3.79	103.6	6.27	10.58	1.73	1471.
498	3.70	34.112	494	27.135	98.0	3.66	93.5	7.26	15.13	1.26	1473.


OXYGEN, ML/L
0.00 2.00 4.00 6.00 8.00 10.00
SALINITY, 0/00
30.50 31.50 32.50 33.50 34.50 35.50
TEMPERATURE, C
1.00 4.00 7.00 10.00 13.00 16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 5 - 11

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 11 DATE 1/ 7/72
POSITICN 50- 0.0 N, 145- 0.0 W GMT 18.0
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	9.58	32.543	0	25.128	284.7	9.58	284.5	0.0	0.0	7.16	1486.
10	9.48	32.546	10	25.147	283.1	9.48	282.7	0.29	0.01	7.18	1485.
20	9.31	32.557	20	25.183	279.9	9.31	279.3	0.57	0.06	7.16	1485.
30	7.71	32.614	30	25.468	252.8	7.71	252.2	0.84	0.13	7.42	1479.
50	5.66	32.706	50	25.808	220.6	5.66	219.8	1.31	0.32	7.25	1471.
75	5.07	32.689	75	25.863	215.6	5.06	214.6	1.85	0.67	7.26	1469.
101	4.44	32.677	100	25.921	210.1	4.43	209.0	2.39	1.15	7.38	1467.
126	4.57	32.934	125	26.111	192.3	4.56	191.0	2.90	1.74	6.79	1469.
152	4.22	33.391	151	26.510	154.7	4.21	153.1	3.36	2.38	5.16	1468.
177	4.55	33.679	176	26.703	136.7	4.54	134.7	3.72	2.99	4.53	1470.
202	4.49	33.765	201	26.778	129.9	4.47	127.6	4.05	3.64	3.82	1471.
254	3.93	33.822	252	26.882	120.2	3.91	117.8	4.69	5.13	2.60	1469.
304	4.08	33.923	302	26.947	114.6	4.06	111.6	5.28	6.81	2.15	1471.
406	3.85	34.043	403	27.065	104.0	3.82	100.2	6.39	10.83	1.53	1472.
508	3.66	34.123	504	27.148	96.9	3.62	92.3	7.43	15.65	1.09	1473.
511	3.66	34.129	507	27.153	96.5	3.62	91.9	7.45	15.80	1.23	1473.
711	3.32	34.259	705	27.289	84.7	3.27	78.9	9.23	26.86	1.21	1475.
913	2.98	34.352	904	27.395	75.4	2.92	68.8	10.83	40.15	0.81	1477.
1115	2.72	34.423	1104	27.474	68.6	2.64	61.2	12.28	55.16	0.94	1479.
1419	2.43	34.491	1404	27.554	61.9	2.33	53.5	14.26	80.67	1.00	1483.
1930	2.03	34.579	1907	27.657	53.1	1.90	43.5	17.17	130.43	1.38	1490.
2444	1.76*	34.627	2412	27.716	48.3	1.59	37.7	19.76	188.12	2.02	1497.
2961	1.61	34.647	2918	27.743	46.5	1.39	34.8	22.20	255.32	2.67	1505.
3477	1.54	34.672	3423	27.768	45.1	1.27	32.1	24.56	332.72	3.08	1514.
3993	1.52	34.686	3926	27.781	45.3	1.20	30.6	26.87	420.62	3.40	1523.
4095	1.53	34.683	4026	27.778	45.9	1.20	30.7	27.34	439.90	3.42	1524.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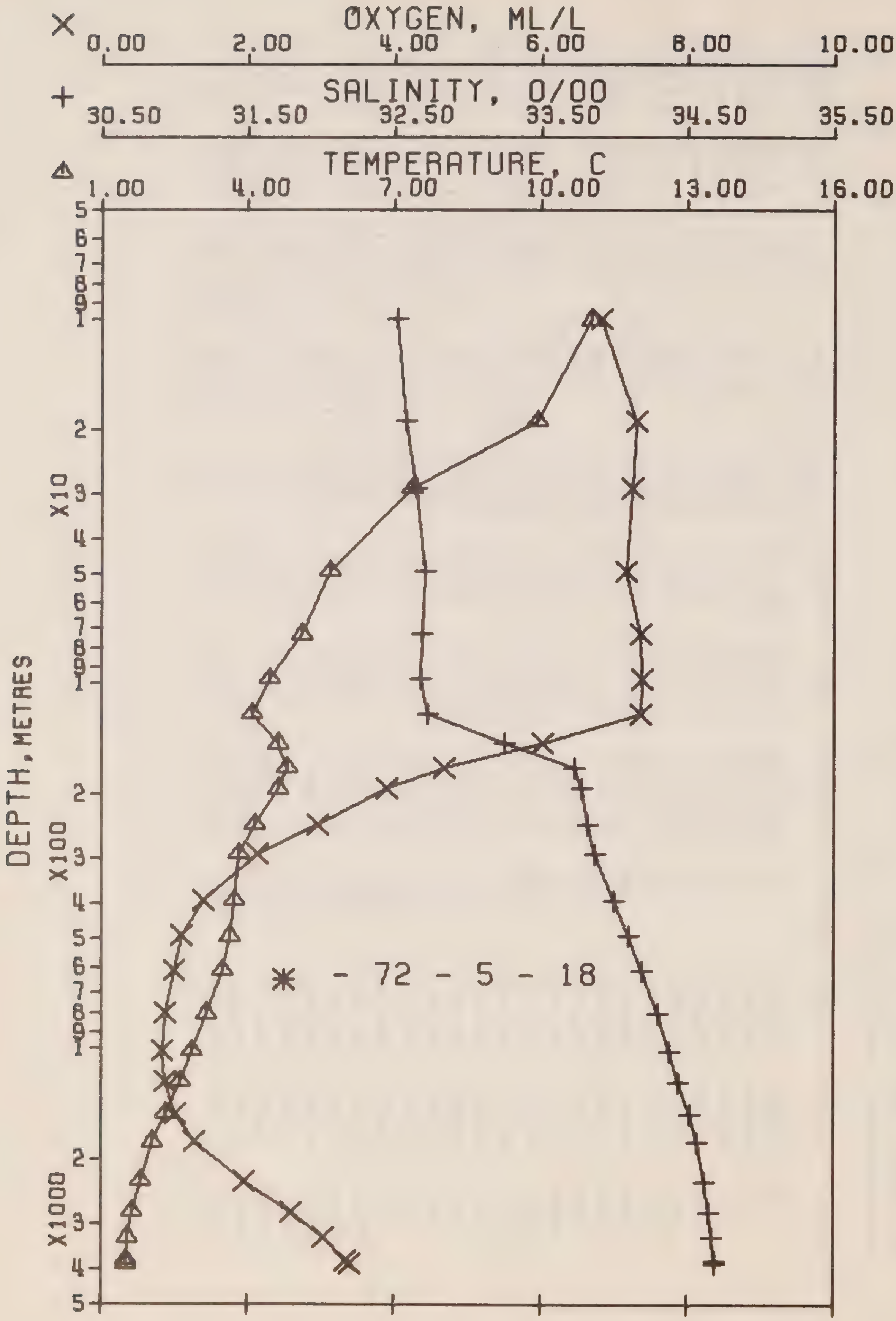
4.00
6.00
8.00
10.00
SALINITY, 0/00
30.50
31.50
32.50
33.50
34.50
35.50
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 5 - 15

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 15 DATE 7/ 7/72
POSITION 50- 0.0 N. 145- 0.0 W GMT 18.2
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	10.62	32.537	0	24.950	301.7	10.62	301.5	0.0	0.0	7.21	1489.
10	10.54	32.537	10	24.964	300.6	10.54	300.2	0.30	0.02	7.22	1489.
19	9.24	32.572	19	25.206	277.7	9.24	277.1	0.57	0.05	7.31	1485.
29	8.04	32.619	29	25.425	257.0	8.04	256.2	0.83	0.12	7.34	1480.
48	5.90	32.661	48	25.744	226.7	5.90	225.9	1.29	0.30	7.34	1472.
73	4.95	32.669	73	25.860	215.8	4.94	214.9	1.84	0.64	7.35	1469.
99	4.41	32.675	98	25.923	210.0	4.40	208.9	2.38	1.11	7.40	1467.
124	4.04	32.746	123	26.017	201.1	4.03	199.9	2.90	1.71	7.35	1466.
149	4.53	33.362	148	26.454	160.0	4.52	158.4	3.36	2.34	5.70	1469.
174	4.57	33.658	173	26.685	138.5	4.56	136.5	3.73	2.95	4.73	1470.
200	4.20	33.728	199	26.779	129.6	4.19	127.5	4.08	3.62	3.74	1469.
252	4.07	33.819	250	26.865	121.8	4.05	119.3	4.72	5.10	2.76	1470.
303	3.92	33.881	301	26.930	116.1	3.90	113.1	5.33	6.83	2.15	1470.
405	3.82	34.022	402	27.052	105.3	3.79	101.6	6.46	10.89	1.54	1471.
505	3.66	34.117	501	27.143	97.3	3.62	92.8	7.47	15.58	1.15	1472.
611	3.51	34.185	606	27.212	91.5	3.47	86.2	8.47	21.27	1.16	1474.
809	3.20	34.295	802	27.329	81.4	3.14	75.1	10.17	33.61	0.91	1476.
1009	3.01	34.367	999	27.404	75.2	2.94	67.9	11.73	48.05	0.87	1478.
1209	2.76	34.433	1197	27.479	68.9	2.68	60.6	13.18	64.37	0.88	1481.
1512	2.42	34.507	1495	27.567	61.1	2.32	52.1	15.13	91.51	0.98	1484.
2022	1.97	34.598	1997	27.677	51.5	1.83	41.6	17.97	142.61	1.52	1491.
2536	1.73	34.639	2502	27.728	47.3	1.55	36.5	20.49	201.15	2.22	1499.
3054	1.59	34.666	3009	27.760	45.1	1.36	33.2	22.87	268.95	2.82	1507.
3574	1.53	34.683	3518	27.778	44.5	1.25	31.1	25.20	347.55	3.20	1515.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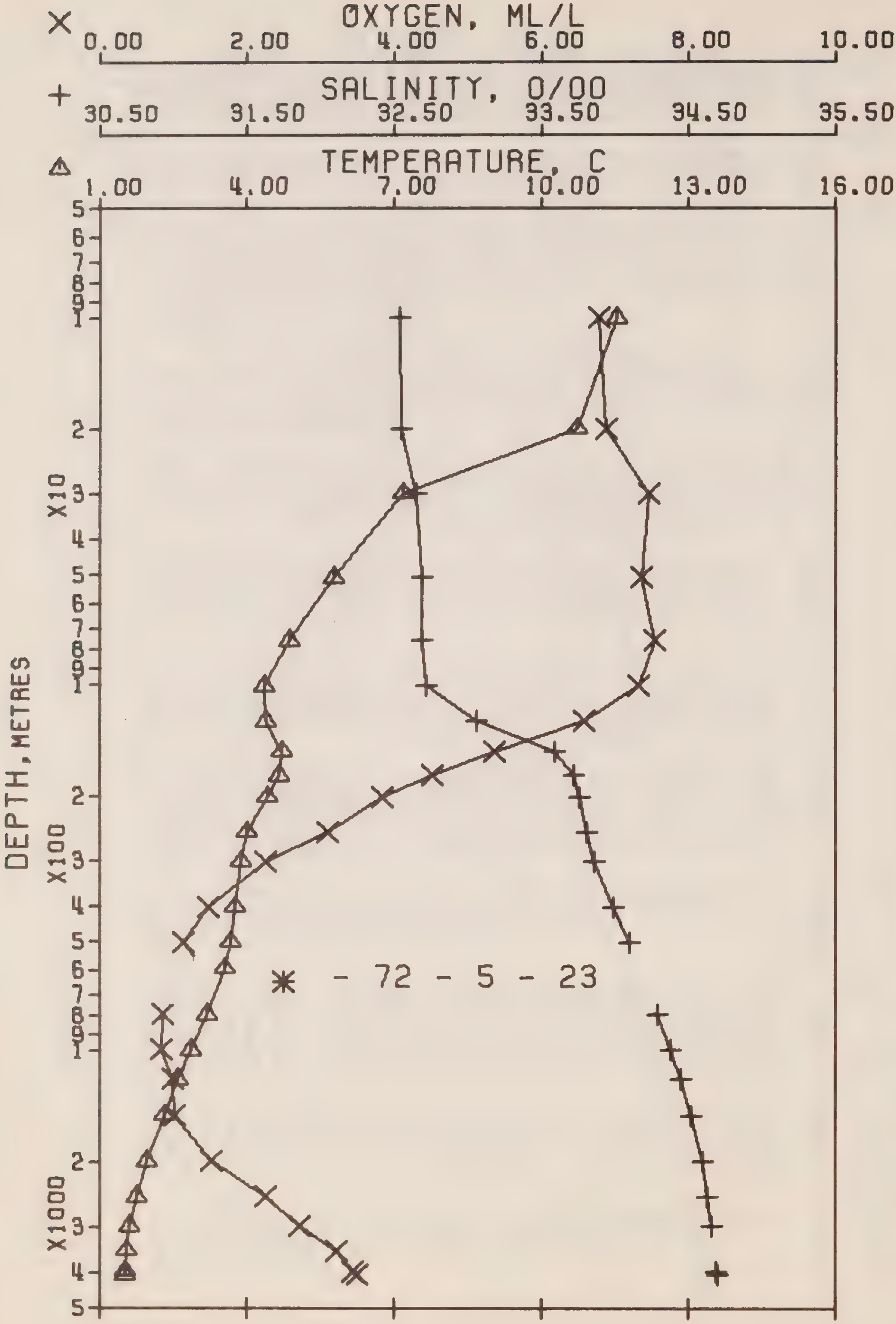
+ SALINITY, 0/00
30.50 31.50 32.50 33.50 34.50 35.50
△ TEMPERATURE, C
1.00 4.00 7.00 10.00 13.00 16.00
DEPTH, METRES
X10
X100
X1000
✳ - 72 - 5 - 18

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 18 DATE 13/ 7/72
POSITION 50- 0.0 N. 145- 0.0 W GMT 18.2
HYDROGRAPHIC CAST DATA

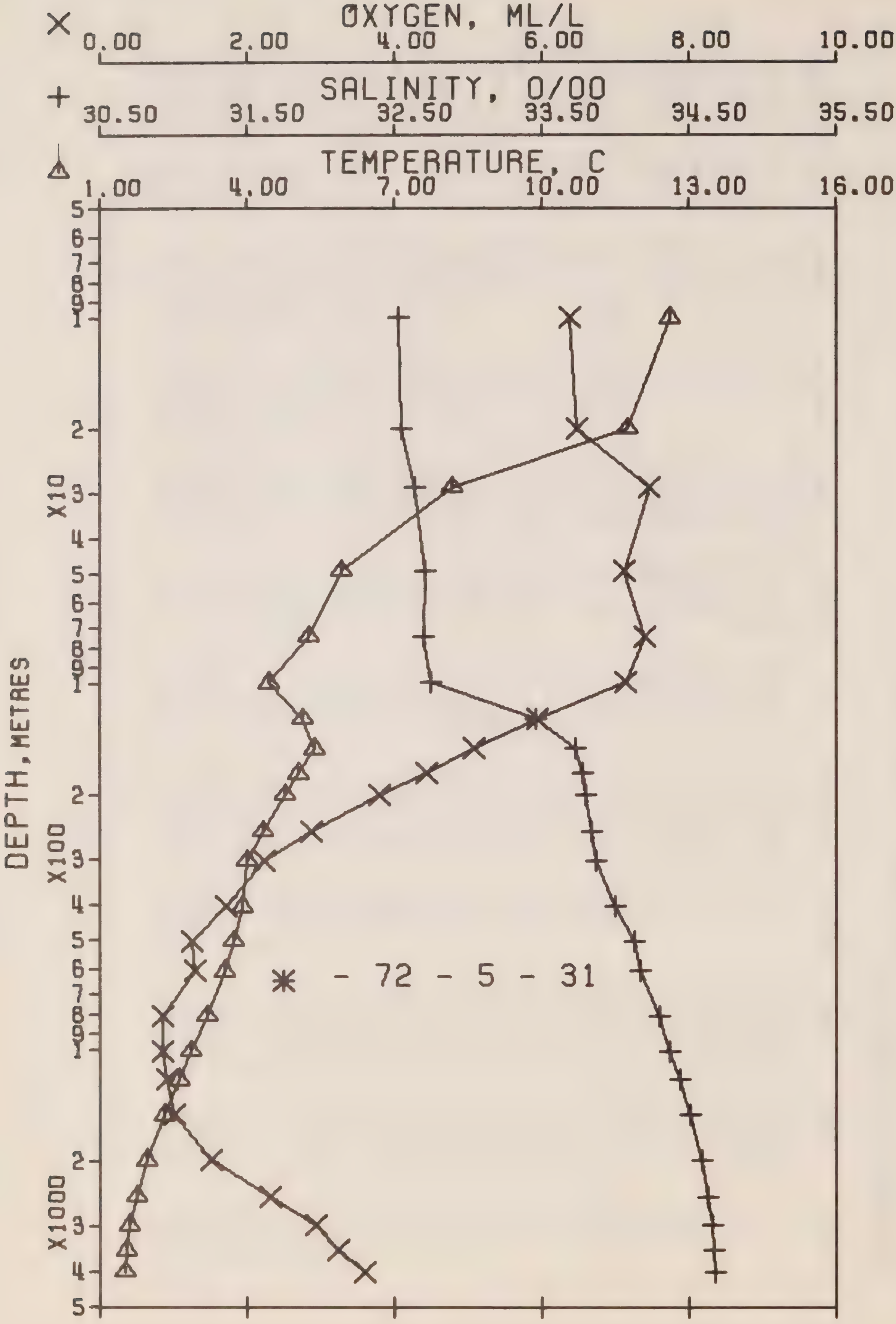
PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	11.05	32.525	0	24.865	309.7	11.05	309.5	0.0	0.0	0.0	1491.
10	11.01	32.521	10	24.869	309.6	11.01	309.1	0.31	0.02	6.83	1491.
19	9.91	32.580	19	25.103	287.5	9.91	286.8	0.58	0.06	7.29	1487.
29	7.37	32.647	29	25.542	245.8	7.37	245.2	0.85	0.12	7.24	1478.
49	5.69	32.709	49	25.807	220.7	5.69	220.0	1.31	0.31	7.16	1472.
73	5.12	32.693	73	25.860	215.8	5.11	214.8	1.83	0.63	7.36	1470.
98	4.45	32.678	97	25.921	210.1	4.44	209.1	2.35	1.08	7.38	1467.
122	4.10	32.734	121	26.001	202.5	4.09	201.4	2.85	1.65	7.36	1466.
147	4.63	33.251	146	26.356	169.4	4.62	167.7	3.32	2.29	6.02	1470.
171	4.80	33.732	170	26.718	135.4	4.79	133.3	3.69	2.88	4.68	1471.
195	4.63	33.785	194	26.779	129.8	4.62	127.5	4.00	3.48	3.89	1471.
245	4.16	33.819	243	26.856	122.7	4.14	120.2	4.63	4.87	2.96	1470.
295	3.83	33.869	293	26.929	116.0	3.81	113.2	5.23	6.53	2.14	1469.
395	3.73	33.998	392	27.042	106.1	3.70	102.5	6.33	10.41	1.39	1471.
497	3.63	34.099	493	27.132	98.3	3.60	93.9	7.37	15.14	1.11	1472.
617	3.49	34.190	612	27.218	91.0	3.45	85.7	8.51	21.60	1.00	1474.
807	3.15	34.305	800	27.342	80.1	3.09	73.8	10.13	33.35	0.89	1476.
1025	2.87	34.384	1015	27.430	72.6	2.80	65.3	11.78	48.78	0.84	1478.
1246	2.63	34.442	1233	27.497	66.9	2.55	58.9	13.32	66.59	0.88	1481.
1526	2.33	34.516	1509	27.582	59.5	2.23	50.8	15.09	91.54	1.01	1484.
1822	2.06	34.574	1801	27.650	53.4	1.94	44.2	16.75	119.99	1.28	1488.
2333	1.81	34.621	2303	27.707	48.9	1.65	38.5	19.34	174.82	1.95	1496.
2836	1.64	34.651	2796	27.744	46.2	1.43	34.8	21.72	237.59	2.59	1503.
3337	1.55	34.673	3286	27.768	44.8	1.30	32.2	23.99	309.09	3.05	1512.
3842	1.51	34.686	3779	27.782	44.7	1.20	30.6	26.24	391.15	3.35	1520.
3943	1.52	34.686	3878	27.781	45.1	1.20	30.6	26.69	409.24	3.41	1522.



OXYGEN, ML/L
0.00 2.00 4.00 6.00 8.00 10.00
SALINITY, 0/00
30.50 31.50 32.50 33.50 34.50 35.50
TEMPERATURE, C
1.00 4.00 7.00 10.00 13.00 16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 5 - 23

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 23 CATE 19/ 7/72
POSITION 50- 0.0 N. 145- 0.0 W GMT 17.9
HYDROGRAPHIC CAST CATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	12.20	32.541	0	24.668	328.6	12.20	328.4	0.0	0.0	6.77	1495.
10	11.54	32.541	10	24.790	317.1	11.54	316.7	0.32	0.02	6.78	1493.
20	10.71	32.547	20	24.942	302.9	10.71	302.1	0.64	0.07	6.88	1490.
30	7.18	32.653	30	25.572	242.9	7.18	242.2	0.91	0.13	7.46	1477.
51	5.78	32.687	51	25.779	223.5	5.78	222.6	1.39	0.33	7.36	1472.
76	4.87	32.693	76	25.888	213.2	4.86	212.2	1.93	0.69	7.54	1469.
102	4.37	32.719	101	25.962	206.3	4.36	205.2	2.46	1.17	7.31	1467.
127	4.39	33.060	126	26.230	181.0	4.38	179.7	2.96	1.75	6.57	1468.
153	4.72	33.591	152	26.615	144.9	4.71	143.1	3.38	2.35	5.35	1470.
178	4.67	33.718	177	26.721	135.1	4.66	133.0	3.73	2.94	4.52	1471.
203	4.41	33.759	202	26.782	129.5	4.40	127.2	4.06	3.58	3.85	1470.
254	4.01	33.809	252	26.863	122.0	3.99	119.5	4.69	5.06	3.11	1469.
305	3.88	33.861	303	26.918	117.2	3.86	114.3	5.31	6.81	2.25	1470.
406	3.77	33.990	403	27.031	107.2	3.74	103.5	6.44	10.91	1.47	1471.
507	3.68	34.101	503	27.129	98.7	3.64	94.2	7.48	15.74	1.14	1473.
599	3.55	34.175*	594	27.200	92.5	3.51	87.4	8.35	20.69		1474.
800	3.19	34.292	793	27.328	81.5	3.13	75.2	10.10	33.12	0.87	1476.
1002	2.87	34.382	992	27.428	72.6	2.80	65.5	11.64	47.33	0.83	1478.
1204	2.59	34.454	1192	27.510	65.4	2.51	57.6	13.04	62.98	1.00	1480.
1509	2.33	34.517	1492	27.583	59.4	2.23	50.7	14.92	89.08	1.03	1484.
2017	1.96	34.599	1992	27.678	51.2	1.82	41.5	17.71	139.10	1.52	1491.
2525	1.74	34.635	2491	27.724	47.7	1.56	36.9	20.20	196.90	2.26	1499.
3031	1.60	34.658	2987	27.753	45.8	1.38	33.9	22.56	263.65	2.73	1506.
3535	1.53	34.674*	3480	27.771	45.0	1.26	31.8	24.84	340.10	3.21	1515.
4034	1.52	34.692	3966	27.786	45.0	1.19	30.1	27.09	426.60	3.44	1523.
4132	1.52	34.697	4062	27.790	44.9	1.18	29.7	27.53	445.02	3.50	1525.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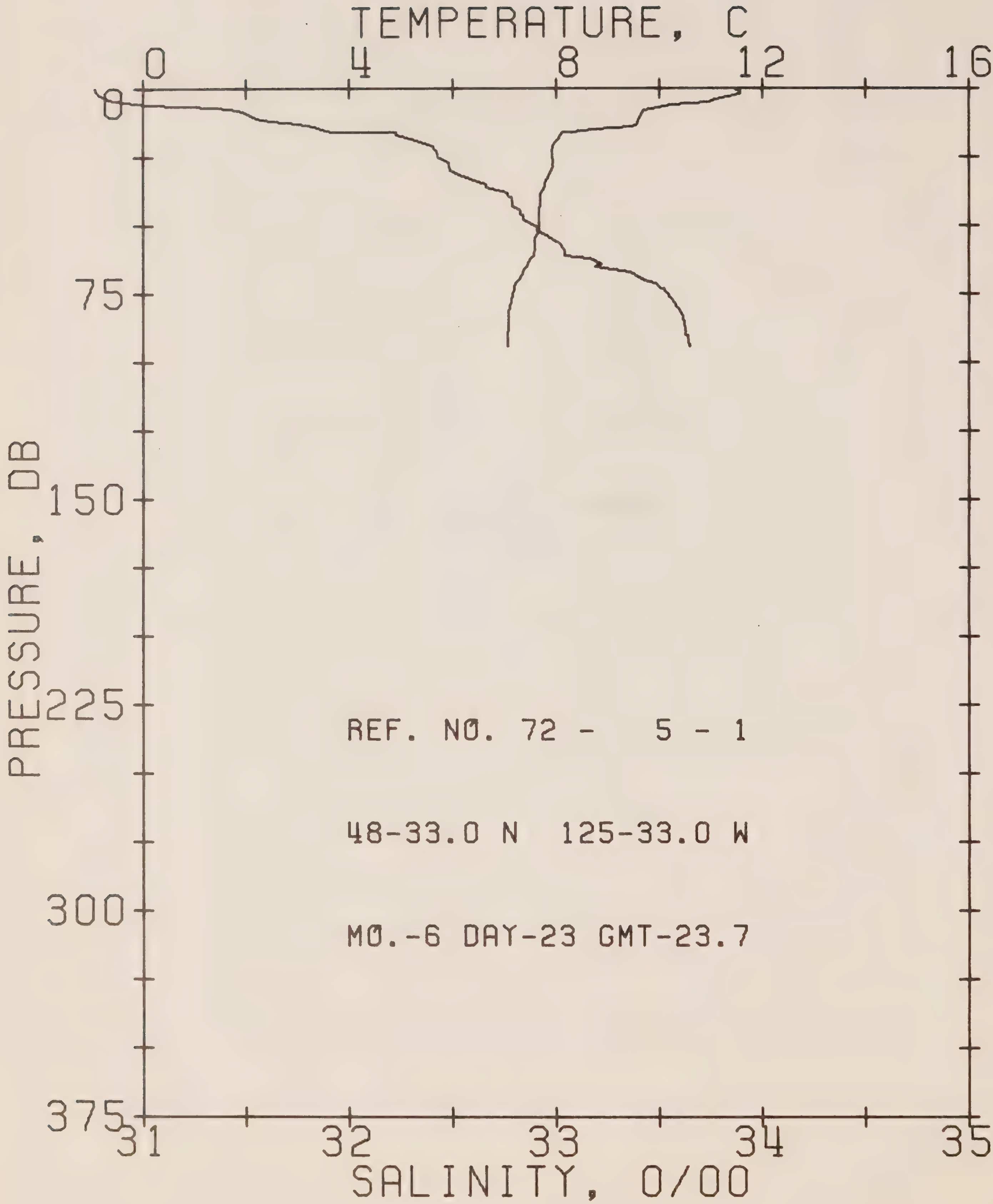
DEPTH, METRES
X10
X100
X1000
* - 72 - 5 - 31

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 31 DATE 29/ 7/72
POSITION 50- 0.0 N. 145- 0.0 W GMT 18.4
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	12.65	32.525	0	24.569	338.0	12.65	337.7	0.0	0.0	6.38	1497.
10	12.62	32.529	10	24.578	337.3	12.62	336.8	0.34	0.02	6.38	1497.
20	11.74	32.554	20	24.763	319.9	11.74	319.2	0.67	0.07	6.47	1494.
29	8.16	32.639	29	25.423	257.2	8.16	256.4	0.94	0.13	7.45	1481.
49	5.92	32.709	49	25.779	223.4	5.92	222.6	1.40	0.32	7.12	1473.
74	5.25	32.697	74	25.849	216.9	5.24	216.0	1.95	0.67	7.41	1470.
100	4.46	32.753	99	25.979	204.6	4.45	203.5	2.48	1.15	7.13	1467.
125	5.14	33.462	124	26.466	158.9	5.13	157.3	2.94	1.67	5.94	1472.
151	5.39	33.727	150	26.646	142.2	5.38	140.1	3.33	2.21	5.08	1473.
176	5.05	33.783	175	26.730	134.4	5.04	132.1	3.68	2.79	4.45	1472.
201	4.78	33.800	200	26.774	130.4	4.76	128.0	4.01	3.43	3.80	1472.
254	4.33	33.842	252	26.856	122.9	4.31	120.2	4.67	4.97	2.89	1471.
305	3.99	33.873	303	26.916	117.4	3.97	114.5	5.29	6.73	2.25	1470.
408	3.92	34.001	405	27.025	108.0	3.89	104.1	6.45	10.95	1.73	1472.
508	3.74	34.129	504	27.145	97.3	3.70	92.6	7.47	15.72	1.25	1473.
612	3.56	34.170	607	27.195	93.1	3.52	87.8	8.46	21.37	1.30	1474.
812	3.19	34.299	805	27.333	81.0	3.13	74.6	10.20	34.00	0.86	1476.
1013	2.87	34.374	1003	27.422	73.2	2.80	66.1	11.74	48.32	0.86	1478.
1213	2.63	34.438	1201	27.494	67.1	2.55	59.2	13.15	64.24	0.91	1480.
1516	2.32	34.511	1499	27.579	59.7	2.22	51.1	15.05	90.77	1.03	1484.
2022	1.97	34.589	1997	27.669	52.1	1.83	42.3	17.85	141.24	1.51	1491.
2531	1.74	34.629	2497	27.719	48.1	1.56	37.3	20.39	200.12	2.32	1499.
3042	1.59	34.658	2998	27.754	45.6	1.36	33.8	22.77	267.93	2.93	1507.
3558	1.53	34.675	3502	27.772	45.0	1.25	31.7	25.10	346.21	3.23	1515.
4076	1.52	34.681	4007	27.777	45.8	1.19	30.9	27.45	437.59	3.60	1524.

RESULTS OF STD CASTS

(P-72-5)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75
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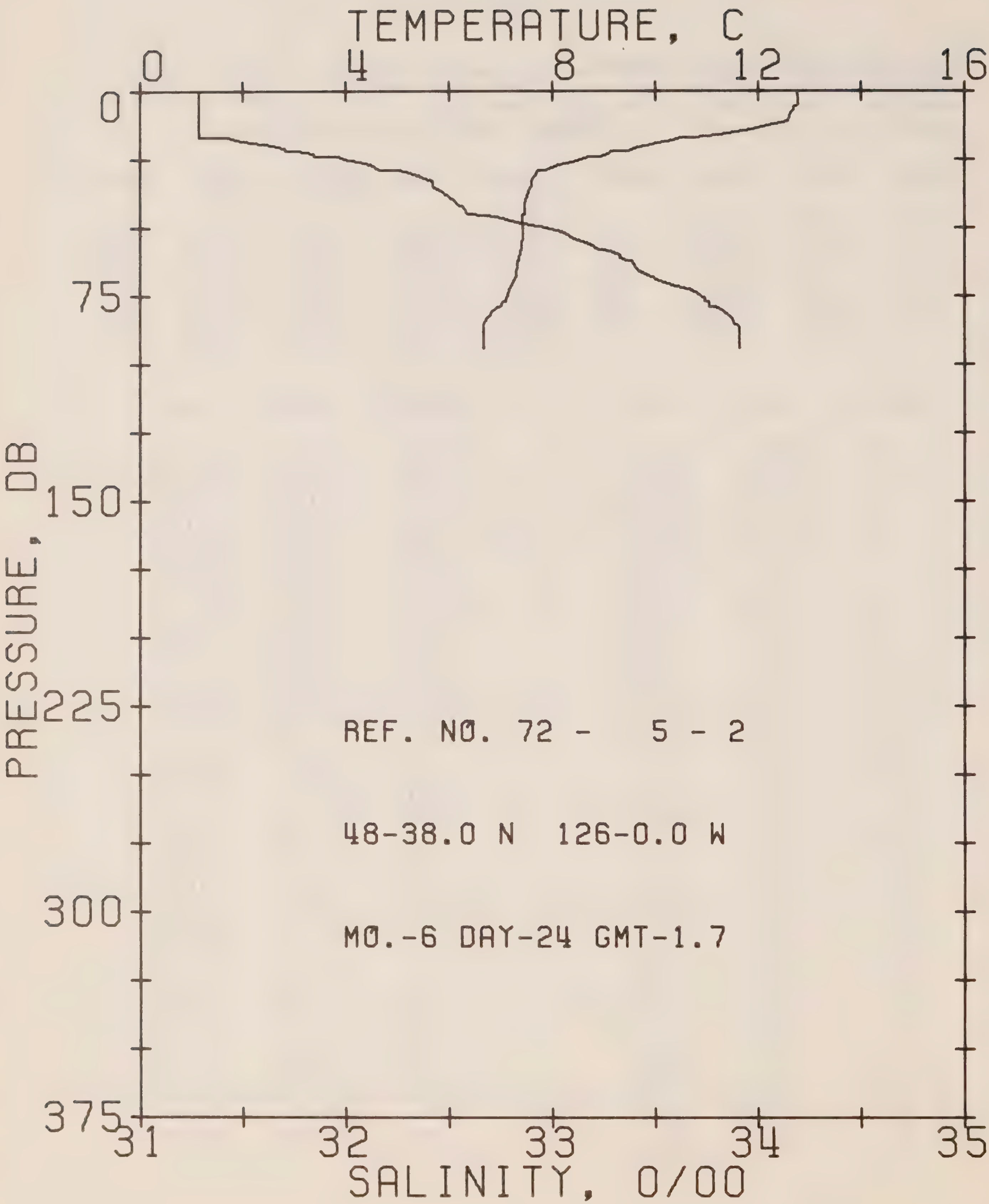
225
300
375
PRESSURE, DB
REF. NO. 72 - 5 - 1
48-33.0 N 125-33.0 W
MO.-6 DAY-23 GMT-23.7
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 1 DATE 23/ 6/72
POSITION 48-33.0N, 125-33.0W GMT 23.7
RESULTS OF STP CAST 63 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	11.47	30.76	0	23.42	447.1	0.0	0.0	1490.
10	9.66	31.52	10	24.32	361.7	0.41	0.02	1485.
20	7.98	32.36	20	25.23	275.3	0.73	0.07	1480.
30	7.91	32.49	30	25.34	264.8	1.00	0.14	1480.
50	7.67	32.90	50	25.70	231.3	1.49	0.33	1480.
75	7.17	33.54	75	26.27	177.3	2.01	0.66	1479.

DEPTH	TEMP	SAL	DEPTH	TEMP	SAL
0.	11.47	30.76	42.	7.72	32.79
1.	11.58	30.77	43.	7.70	32.79
2.	11.56	30.78	44.	7.69	32.82
4.	11.10	30.83	46.	7.68	32.83
5.	10.96	30.91	46.	7.68	32.84
6.	10.23	31.02	48.	7.67	32.84
7.	9.98	31.36	50.	7.67	32.90
8.	9.70	31.46	52.	7.68	32.91
9.	9.68	31.50	52.	7.66	32.91
11.	9.64	31.55	53.	7.65	32.94
12.	9.60	31.63	55.	7.60	32.98
13.	9.56	31.75	56.	7.60	33.01
14.	9.46	31.83	59.	7.59	33.04
15.	8.73	31.87	61.	7.58	33.04
16.	8.29	31.92	62.	7.52	33.16
16.	8.13	32.23	64.	7.46	33.22
17.	8.10	32.23	65.	7.44	33.19
19.	8.02	32.32	67.	7.36	33.36
21.	7.94	32.40	68.	7.36	33.38
24.	7.93	32.43	70.	7.27	33.43
25.	7.93	32.43	71.	7.23	33.48
27.	7.95	32.48	73.	7.19	33.51
29.	7.94	32.48	73.	7.19	33.52
30.	7.91	32.49	82.	7.10	33.61
31.	7.89	32.52	86.	7.10	33.62
32.	7.86	32.55	86.	7.10	33.62
34.	7.82	32.62	88.	7.09	33.63
35.	7.79	32.66	90.	7.08	33.63
36.	7.79	32.66	90.	7.08	33.64
38.	7.73	32.76	93.	7.07	33.64
39.	7.72	32.77	94.	7.06	33.65
40.	7.72	32.79			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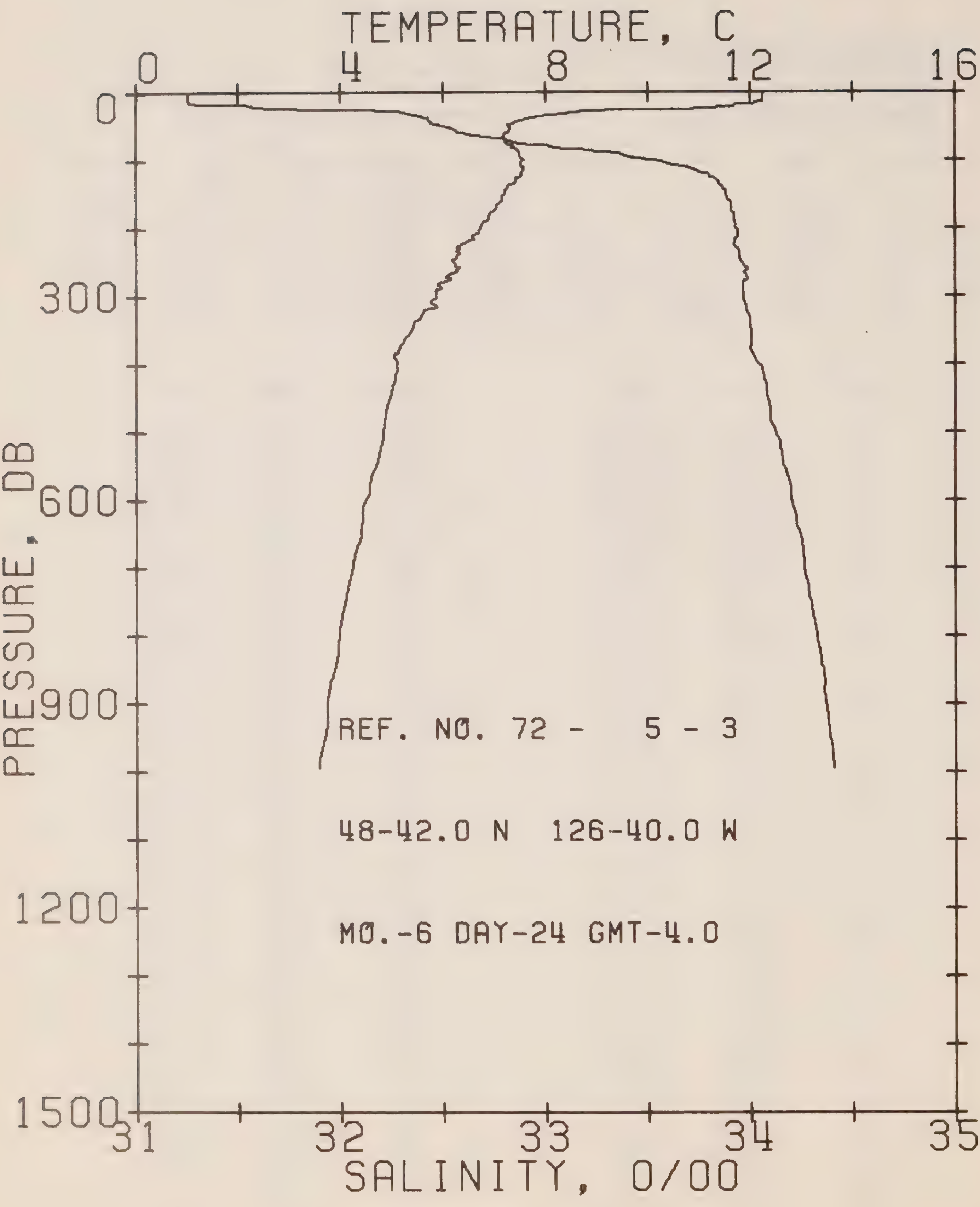
150
225
300
375
PRESSURE, DB
REF. NØ. 72 - 5 - 2
48-38.0 N 126-0.0 W
MØ.-6 DAY-24 GMT-1.7
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 2 DATE 24/ 6/72
POSITION 48-38.0N, 126- 0.0W GMT 1.7
RESULTS OF STP CAST 73 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	12.75	31.29	0	23.60	430.5	0.0	0.0	1495.
10	12.60	31.29	10	23.62	428.3	0.43	0.02	1495.
20	9.80	31.65	20	24.40	354.7	0.83	0.08	1486.
30	7.72	32.31	30	25.23	275.7	1.15	0.16	1479.
50	7.43	32.97	50	25.79	222.8	1.66	0.37	1479.
75	7.13	33.72	75	26.42	163.3	2.14	0.67	1479.

DEPTH	TEMP	SAL	DEPTH	TEMP	SAL
0.	12.75	31.29	45.	7.45	32.60
1.	12.76	31.29	46.	7.42	32.73
1.	12.75	31.29	48.	7.42	32.82
2.	12.76	31.29	50.	7.43	32.97
5.	12.76	31.29	51.	7.43	33.02
6.	12.70	31.29	52.	7.43	33.06
7.	12.70	31.29	54.	7.43	33.10
8.	12.65	31.29	56.	7.42	33.18
11.	12.58	31.29	58.	7.41	33.22
12.	12.32	31.29	58.	7.41	33.24
14.	11.86	31.29	59.	7.39	33.30
15.	11.58	31.29	60.	7.38	33.33
16.	11.23	31.29	61.	7.36	33.33
17.	10.75	31.29	62.	7.35	33.36
17.	10.50	31.43	62.	7.34	33.38
18.	10.34	31.47	65.	7.34	33.41
19.	10.05	31.55	66.	7.32	33.42
20.	9.80	31.65	66.	7.32	33.43
21.	9.56	31.70	68.	7.32	33.48
22.	9.47	31.71	68.	7.32	33.49
22.	9.14	31.77	69.	7.29	33.50
23.	9.10	31.84	71.	7.23	33.58
24.	8.92	31.85	73.	7.17	33.68
24.	8.73	31.97	76.	7.11	33.74
25.	8.55	31.99	77.	7.09	33.74
26.	8.40	32.06	77.	7.07	33.76
27.	8.14	32.12	79.	6.99	33.76
29.	7.86	32.16	79.	6.92	33.79
29.	7.73	32.26	80.	6.89	33.82
30.	7.72	32.31	83.	6.74	33.87
33.	7.60	32.42	85.	6.68	33.88
35.	7.59	32.42	86.	6.67	33.90
37.	7.55	32.47	87.	6.66	33.91
40.	7.50	32.52	88.	6.66	33.91
42.	7.47	32.55	93.	6.66	33.91
42.	7.47	32.56	94.	6.66	33.91
45.	7.46	32.59			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8
12
16
PRESSURE, DB
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300
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900
1200
1500
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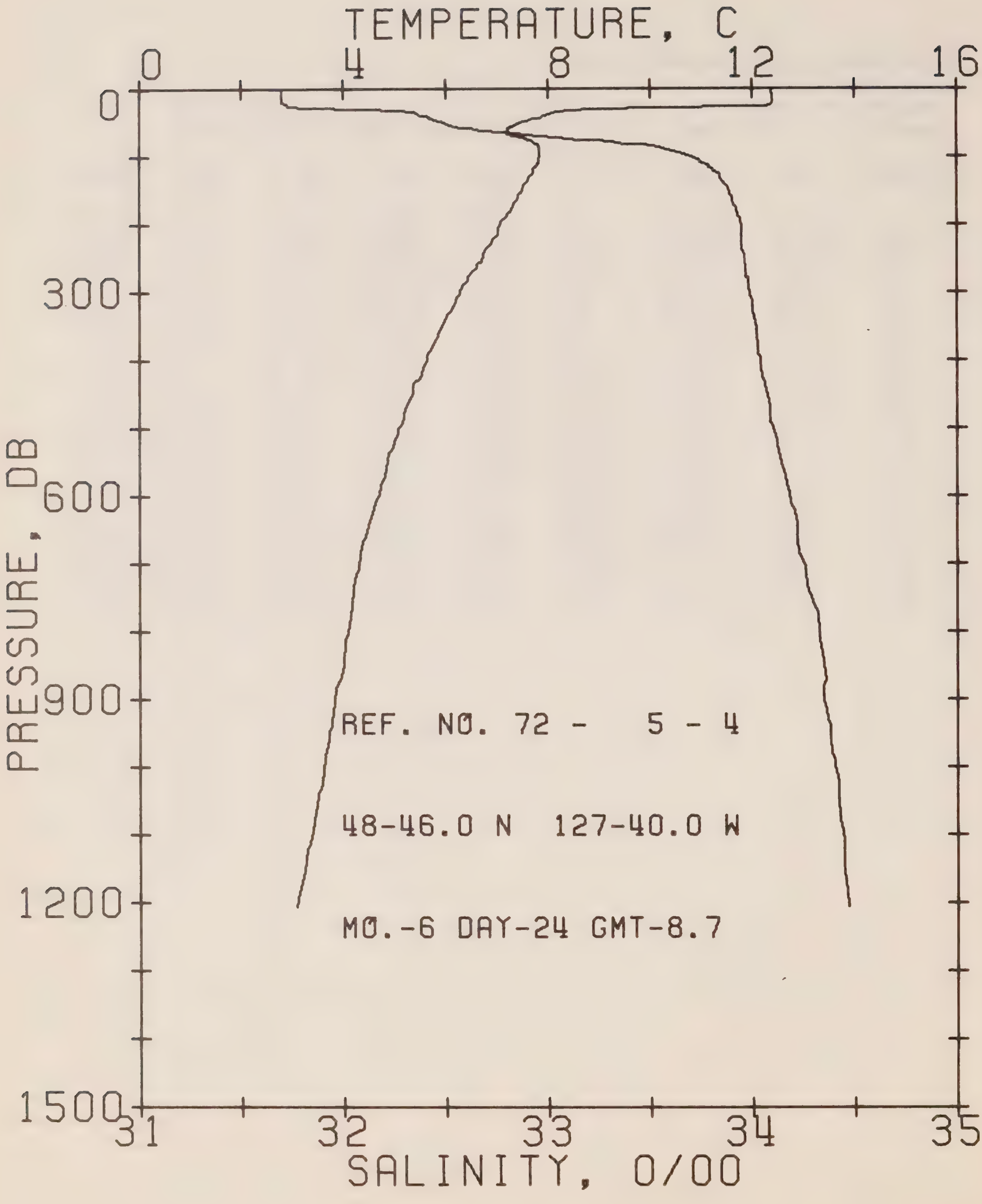
48-42.0 N 126-40.0 W
MO.-6 DAY-24 GMT-4.0
31
32
33
34
35
SALINITY, O/OO

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 3 DATE 24/ 6/72
POSITION 48-42.0N, 126-40.0W GMT 4.0
RESULTS OF STP CAST 224 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. FN	SOUND
0	12.26	31.25	0	23.66	424.6	0.0	0.0	1494.
10	12.25	31.25	10	23.66	424.8	0.42	0.02	1494.
20	11.68	31.57	20	24.01	391.5	0.84	0.09	1492.
30	8.66	32.29	30	25.08	289.9	1.19	0.17	1482.
50	7.26	32.49	50	25.43	256.4	1.73	0.39	1478.
75	7.26	32.88	75	25.74	227.6	2.34	0.78	1479.
100	7.56	33.51	99	26.19	185.1	2.85	1.23	1481.
125	7.47	33.80	124	26.43	162.7	3.28	1.73	1481.
150	7.18	33.88	149	26.54	153.2	3.68	2.27	1481.
175	6.97	33.91	174	26.59	148.5	4.05	2.90	1480.
200	6.73	33.93	199	26.64	144.3	4.42	3.60	1480.
225	6.35	33.92	223	26.68	140.3	4.77	4.37	1479.
250	6.21	33.96	248	26.73	136.3	5.12	5.20	1479.
300	5.86	33.97	298	26.78	131.4	5.78	7.07	1478.
400	5.10	34.04	397	26.93	118.0	7.03	11.50	1477.
500	4.82	34.12	496	27.02	109.8	8.16	16.70	1477.
600	4.48	34.20	595	27.12	101.1	9.22	22.59	1478.
800	3.97	34.33	793	27.28	87.3	11.09	35.94	1479.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300
600
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1200
1500
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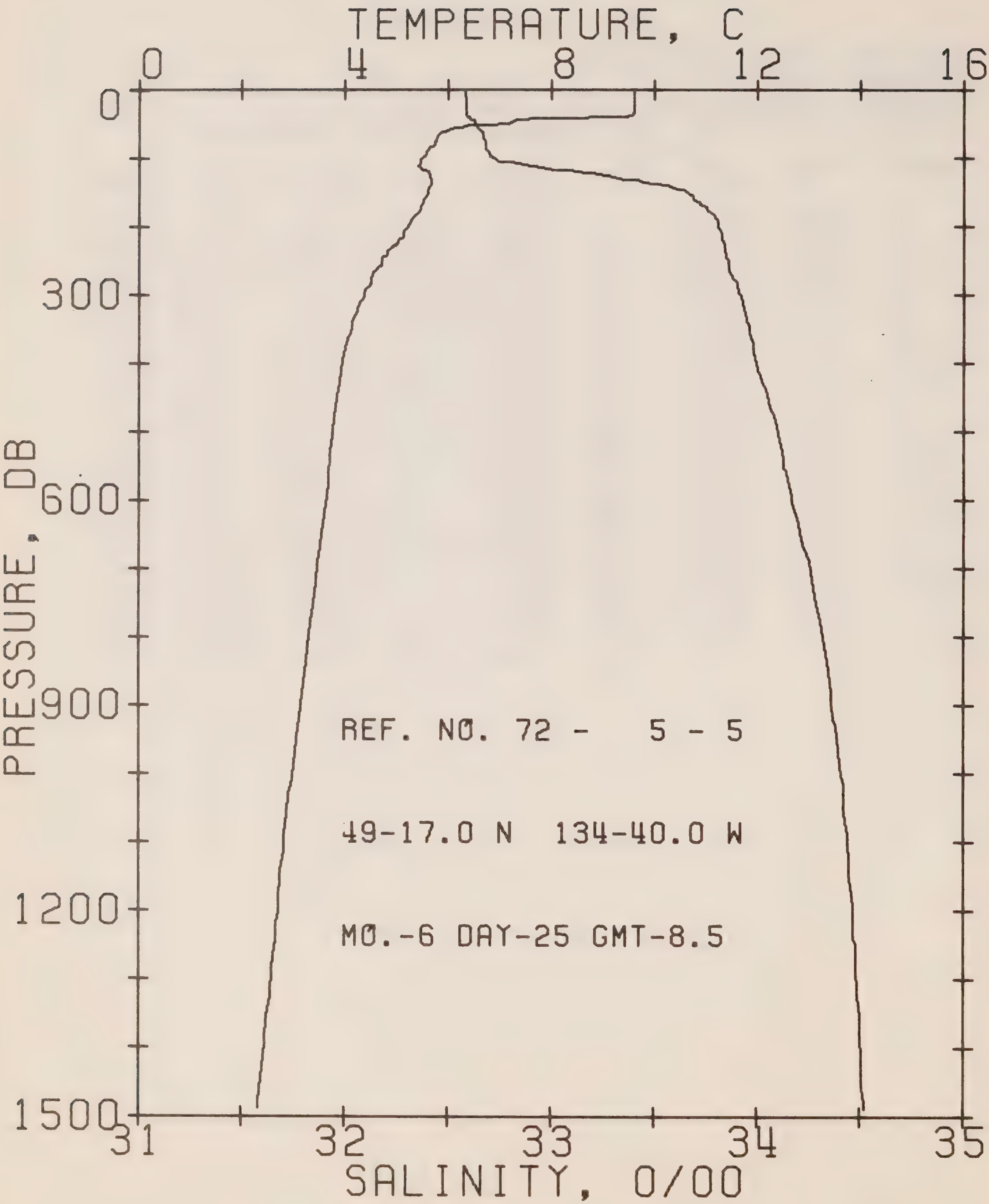
REF. NO. 72 - 5 - 4
48-46.0 N 127-40.0 W
MO.-6 DAY-24 GMT-8.7
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 4 DATE 24/ 6/72
POSITION 48-46.0N, 127-40.0W GMT 8.7
RESULTS OF STP CAST 188 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	12.38	31.64	0	23.94	398.0	0.0	0.0	1495.
10	12.39	31.70	10	23.98	394.1	0.39	0.02	1495.
20	12.39	31.70	20	23.98	394.4	0.79	0.08	1495.
30	9.35	32.01	30	24.75	321.2	1.17	0.18	1485.
50	7.47	32.49	50	25.40	259.2	1.72	0.40	1478.
75	7.59	33.12	75	25.88	214.4	2.31	0.78	1480.
100	7.84	33.69	99	26.29	175.7	2.79	1.20	1482.
125	7.68	33.83	124	26.43	163.5	3.21	1.68	1482.
150	7.50	33.88	149	26.49	157.6	3.61	2.24	1482.
175	7.29	33.91	174	26.55	152.5	4.00	2.88	1482.
200	7.05	33.95	199	26.61	147.3	4.37	3.60	1481.
225	6.87	33.95	223	26.63	145.0	4.74	4.39	1481.
250	6.69	33.96	248	26.67	142.2	5.10	5.26	1481.
300	6.27	33.99	298	26.74	135.1	5.79	7.20	1480.
400	5.61	34.04	397	26.87	124.3	7.09	11.82	1479.
500	5.08	34.10	496	26.98	114.6	8.28	17.28	1478.
600	4.67	34.18	595	27.09	104.6	9.37	23.41	1478.
800	4.08	34.33	793	27.27	88.7	11.30	37.08	1479.
1000	3.59	34.40	991	27.38	79.4	12.98	52.51	1481.
1200	3.09	34.47	1188	27.48	70.1	14.47	69.19	1482.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16
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300
600
900
1200
1500
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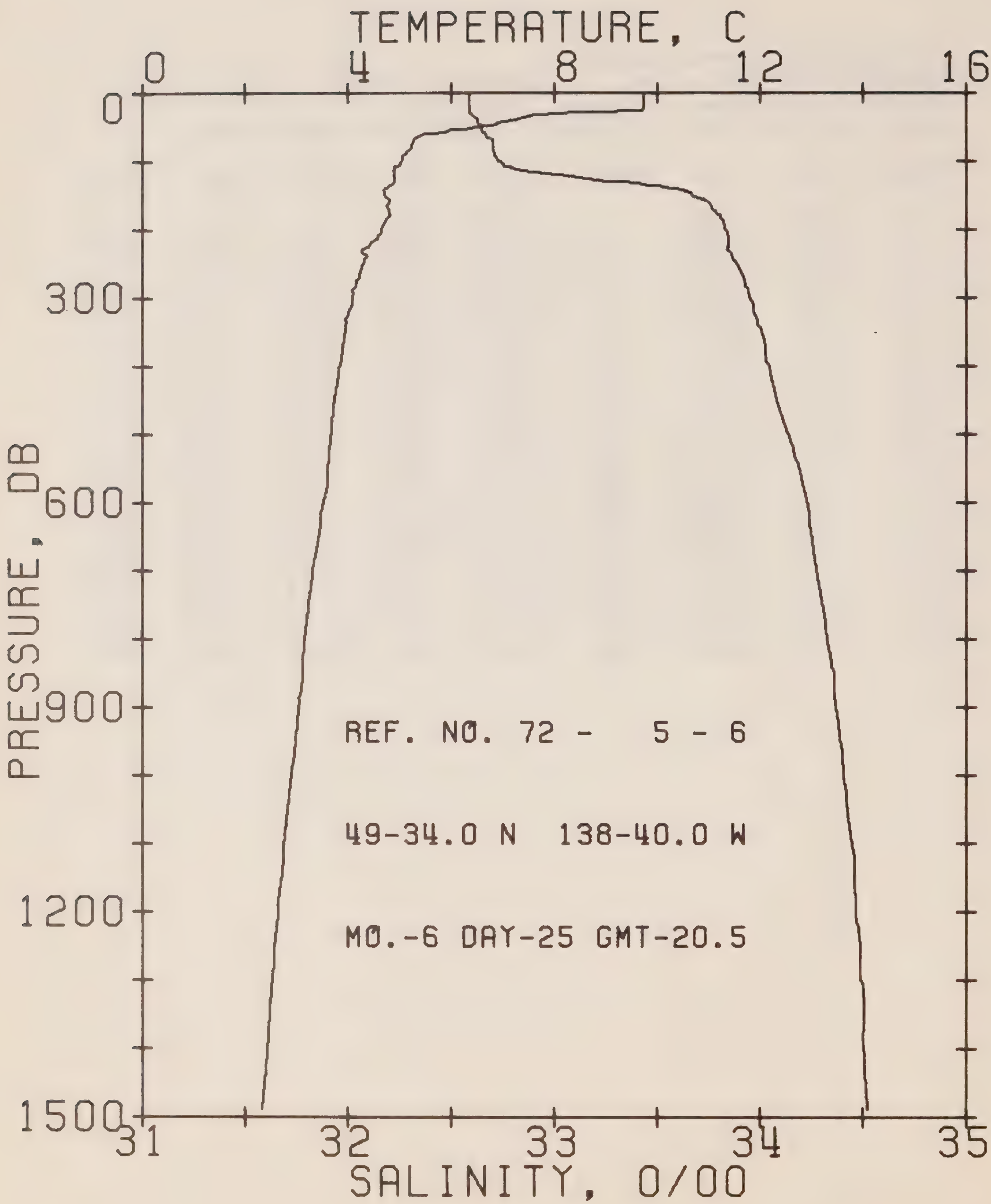
REF. NO. 72 - 5 - 5
49-17.0 N 134-40.0 W
MO.-6 DAY-25 GMT-8.5
31
32
33
34
35
SALINITY, O/OO

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 5 DATE 25/ 6/72
POSITION 49-17.0N. 134-40.0W GMT 8.5
RESULTS OF STP CAST 187 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	9.61	32.58	0	25.15	282.2	0.0	0.0	1486.
10	9.59	32.58	10	25.16	282.2	0.28	0.01	1486.
20	9.59	32.59	20	25.16	281.8	0.56	0.06	1486.
30	9.59	32.59	30	25.16	281.9	0.85	0.13	1486.
50	7.18	32.63	50	25.55	244.9	1.38	0.35	1477.
75	5.76	32.68	75	25.78	224.0	1.95	0.71	1472.
100	5.51	32.71	99	25.83	218.8	2.51	1.20	1472.
125	5.66	33.25	124	26.24	180.7	3.02	1.78	1473.
150	5.59	33.66	149	26.57	149.8	3.43	2.36	1474.
175	5.45	33.75	174	26.66	141.4	3.79	2.96	1474.
200	5.23	33.81	199	26.73	134.6	4.13	3.61	1474.
225	5.00	33.84	223	26.78	130.1	4.46	4.33	1473.
250	4.72	33.86	248	26.83	125.7	4.78	5.11	1472.
300	4.37	33.91	298	26.91	118.5	5.40	6.82	1472.
400	3.95	33.99	397	27.01	108.8	6.52	10.84	1472.
500	3.75	34.10	496	27.12	99.7	7.57	15.61	1473.
600	3.64	34.17	595	27.19	93.8	8.53	21.03	1474.
800	3.31	34.32	793	27.34	80.6	10.27	33.36	1476.
1000	3.00	34.41	990	27.44	72.1	11.79	47.33	1478.
1200	2.71	34.47	1188	27.51	65.6	13.16	62.66	1480.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12
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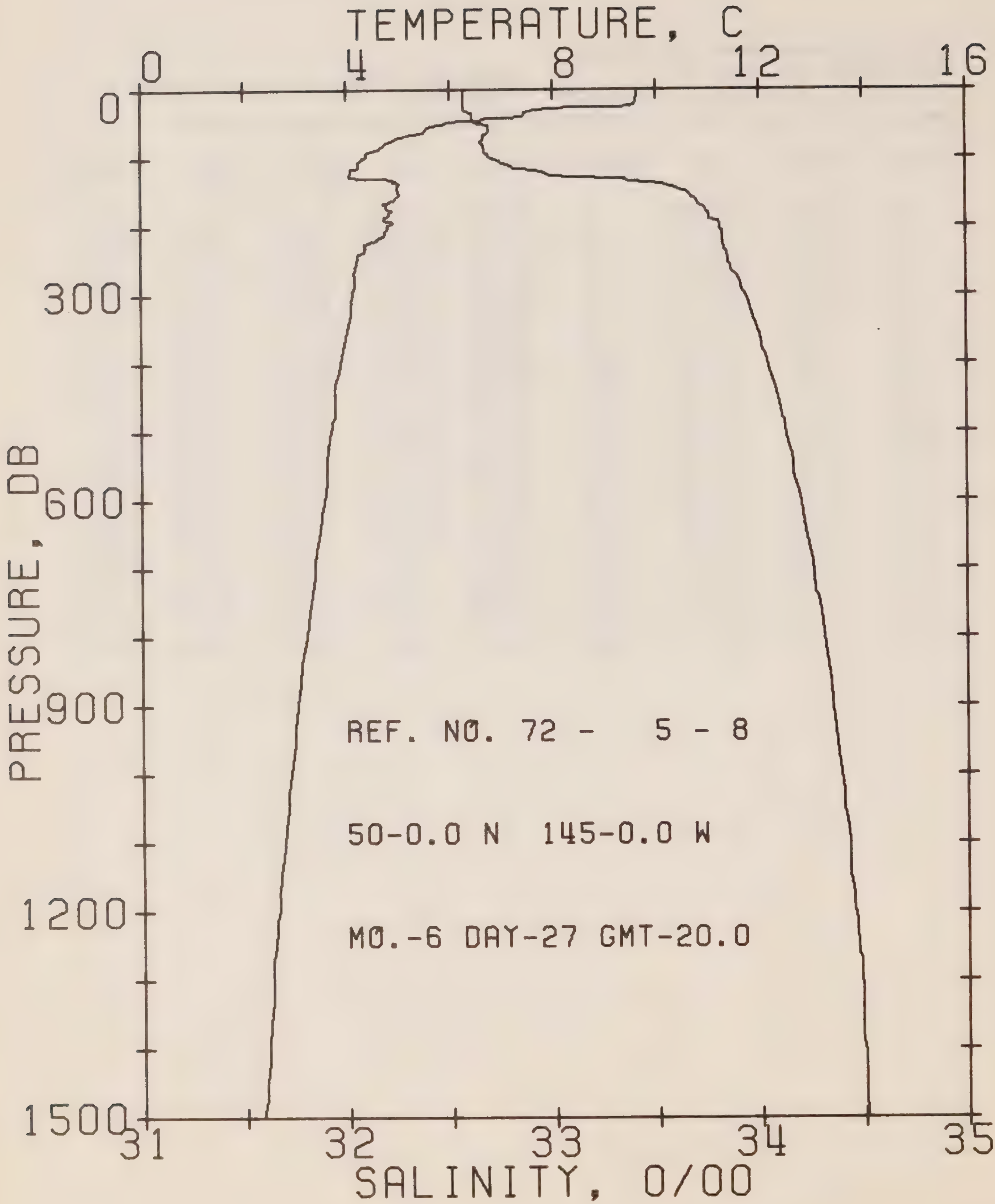
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 5 - 6
49-34.0 N 138-40.0 W
MO.-6 DAY-25 GMT-20.5
31
32
33
34
35
SALINITY, O/OO

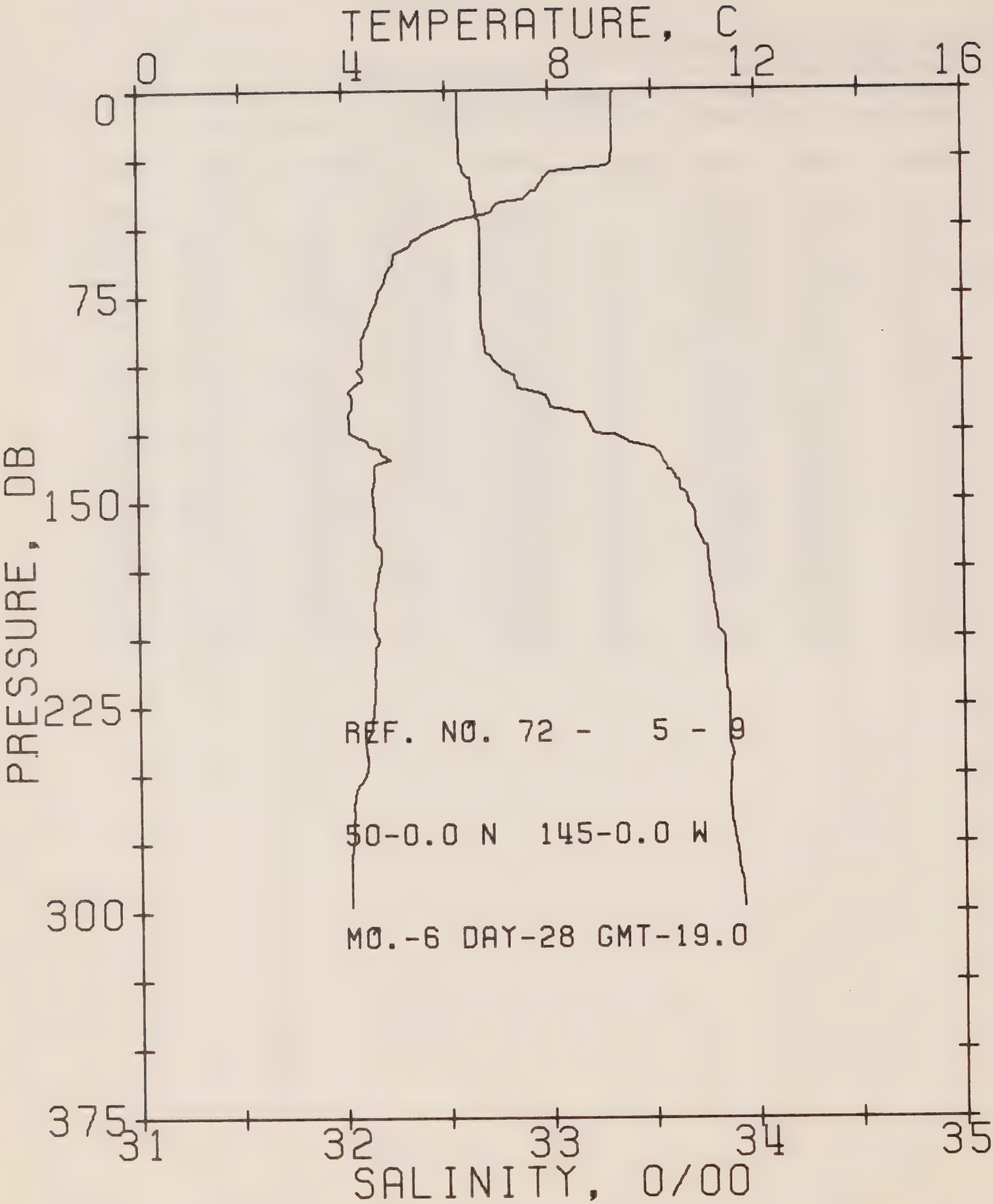
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 6 DATE 25/ 6/72
POSITION 49-34.0N, 138-40.0W GMT 20.5
RESULTS OF STP CAST 194 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	9.74	32.58	0	25.13	284.2	0.0	0.0	1486.
10	9.74	32.59	10	25.14	283.8	0.28	0.01	1487.
20	9.73	32.59	20	25.14	283.9	0.57	0.06	1487.
30	8.11	32.59	30	25.39	260.1	0.85	0.13	1481.
50	6.57	32.64	50	25.64	236.4	1.34	0.33	1475.
75	5.23	32.70	75	25.85	216.5	1.90	0.68	1470.
100	5.03	32.73	99	25.90	212.5	2.44	1.16	1470.
125	4.91	33.14	124	26.24	180.5	2.94	1.74	1470.
150	4.73	33.67	149	26.68	139.1	3.33	2.28	1471.
175	4.81	33.79	174	26.76	131.5	3.66	2.83	1471.
200	4.63	33.83	199	26.81	126.5	3.98	3.45	1471.
225	4.39	33.85	223	26.86	122.7	4.29	4.12	1471.
250	4.28	33.88	248	26.90	119.1	4.60	4.86	1471.
300	4.08	33.95	298	26.97	112.5	5.17	6.47	1471.
400	3.83	34.04	397	27.07	103.7	6.25	10.31	1471.
500	3.66	34.14	496	27.16	96.0	7.25	14.89	1472.
600	3.52	34.23	595	27.25	88.0	8.17	20.03	1474.
800	3.16	34.33	793	27.36	78.5	9.84	31.88	1475.
1000	2.91	34.41	990	27.45	70.9	11.33	45.53	1478.
1200	2.63	34.47	1188	27.52	64.6	12.68	60.64	1480.


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 5 - 8
50-0.0 N 145-0.0 W
MO.-6 DAY-27 GMT-20.0
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 8 DATE 27/ 6/72
POSITICN 50- 0.0N. 145- 0.0W GMT 20.0
RESULTS OF STP CAST 215 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	9.64	32.57	0	25.14	283.4	0.0	0.0	1486.
10	9.62	32.57	10	25.14	283.5	0.28	0.01	1486.
20	9.58	32.57	20	25.15	283.0	0.57	0.06	1486.
30	7.64	32.57	30	25.44	255.2	0.84	0.13	1479.
50	5.93	32.64	50	25.72	228.7	1.33	0.33	1472.
75	4.88	32.65	75	25.85	216.5	1.88	0.68	1469.
100	4.32	32.70	99	25.95	207.2	2.41	1.15	1467.
125	4.05	32.98	124	26.20	183.6	2.90	1.71	1466.
150	4.99	33.64	149	26.63	143.8	3.30	2.26	1472.
175	4.83	33.74	174	26.72	135.2	3.65	2.84	1471.
200	4.81	33.81	199	26.78	129.9	3.98	3.48	1472.
225	4.39	33.82	223	26.83	124.9	4.30	4.17	1471.
250	4.20	33.85	248	26.88	120.9	4.61	4.91	1470.
300	4.10	33.93	298	26.95	114.2	5.20	6.56	1471.
400	3.87	34.04	397	27.06	104.5	6.29	10.46	1472.
500	3.68	34.12	496	27.15	97.0	7.29	15.05	1473.
600	3.54	34.20	595	27.22	90.7	8.23	20.31	1474.
800	3.19	34.31	793	27.34	79.9	9.94	32.46	1476.
1000	2.88	34.39	990	27.43	72.3	11.46	46.37	1478.
1200	2.62	34.45	1188	27.51	65.8	12.84	61.80	1480.


TEMPERATURE, C
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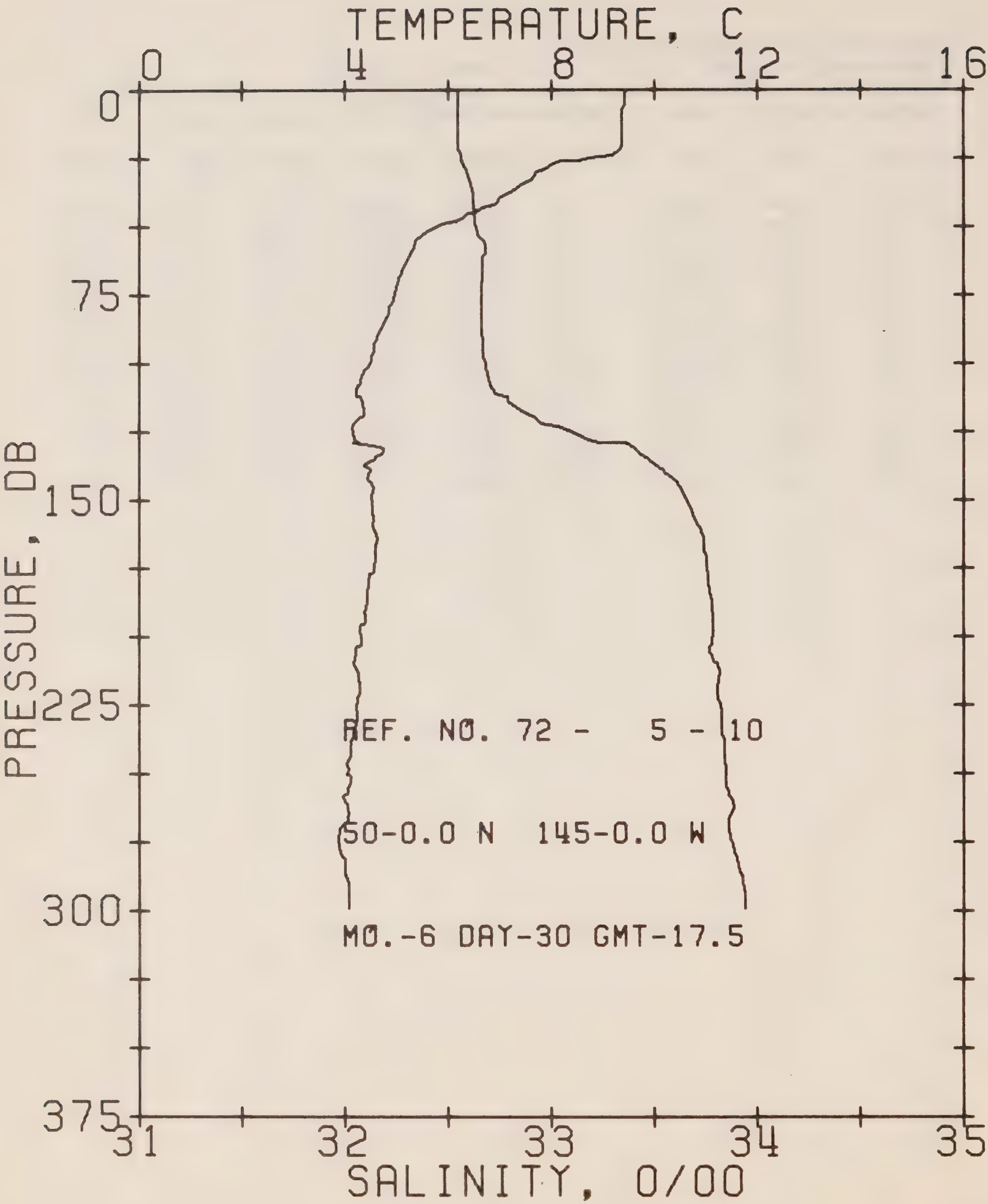
4
8
12
16
PRESSURE, DB
0
75
150
225
300
375
REF. NO. 72 - 5 - 9
50-0.0 N 145-0.0 W
MO.-6 DAY-28 GMT-19.0
31
32
33
34
35
SALINITY, 0/00

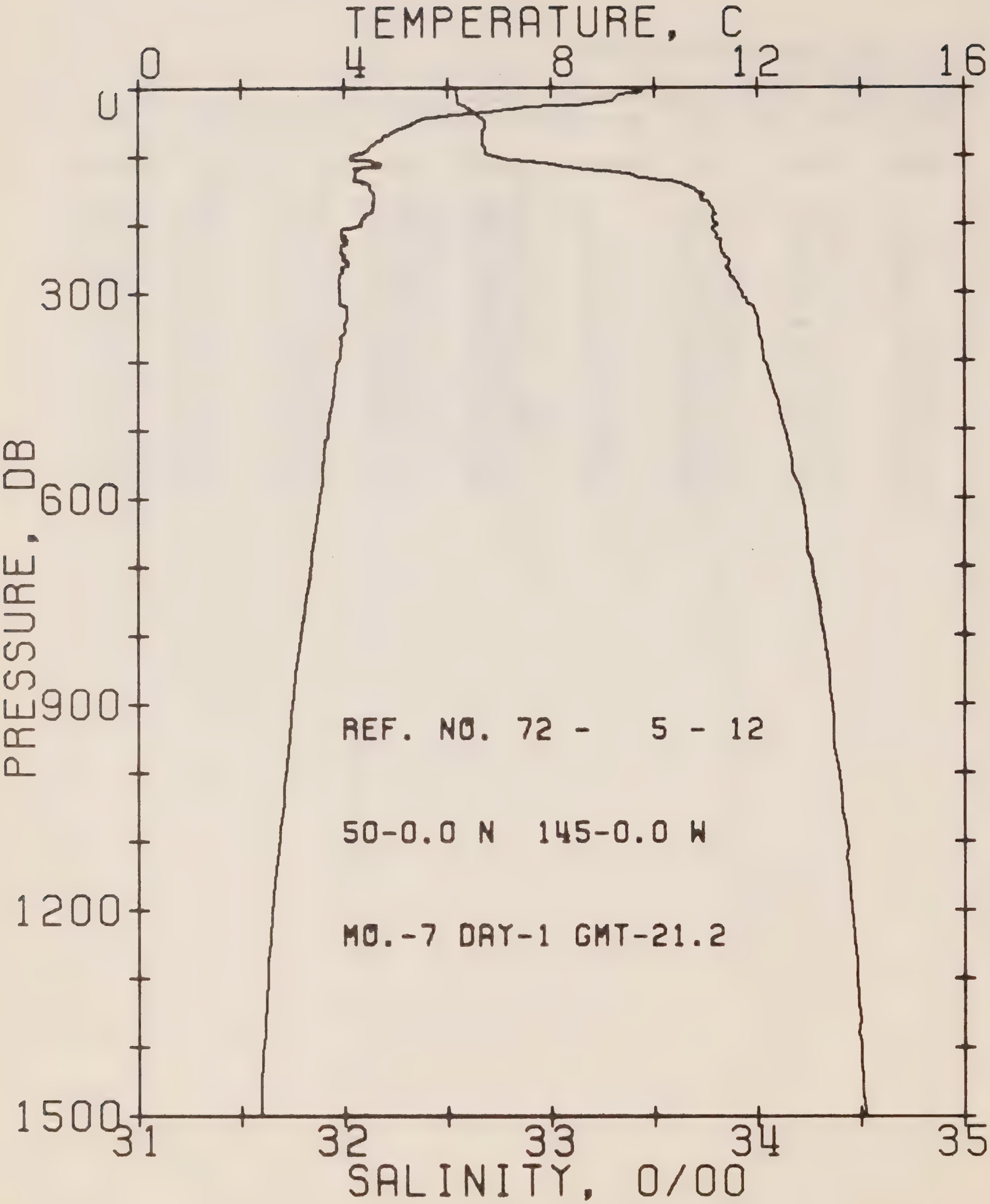
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 9 DATE 28/ 6/72
POSITION 50- 0.0N, 145- 0.0W GMT 19.0
RESULTS OF STP CAST 136 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	9.24	32.56	0	25.20	278.0	0.0	0.0	1484.
10	9.22	32.56	10	25.20	278.1	0.28	0.01	1485.
20	9.22	32.57	20	25.21	277.6	0.56	0.06	1485.
30	8.02	32.58	30	25.40	259.6	0.83	0.13	1480.
50	5.87	32.66	50	25.75	226.1	1.32	0.33	1472.
75	4.66	32.66	75	25.89	213.2	1.86	0.67	1468.
100	4.36	32.74	99	25.98	204.6	2.39	1.14	1467.
125	4.11	33.21	124	26.38	166.9	2.85	1.67	1467.
150	4.56	33.67	149	26.69	137.5	3.22	2.18	1470.
175	4.66	33.77	174	26.76	131.1	3.55	2.74	1471.
200	4.65	33.84	199	26.82	126.0	3.88	3.35	1471.
225	4.54	33.86	223	26.85	123.5	4.19	4.03	1471.
250	4.36	33.87	248	26.88	121.0	4.49	4.77	1471.


TEMPERATURE, C
0
4
8
12
16
0
75
150
225
300
375
PRESSURE, DB
REF. NO. 72 - 5 - 10
50-0.0 N 145-0.0 W
MO.-6 DAY-30 GMT-17.5
31
32
33
34
35
SALINITY, 0/00

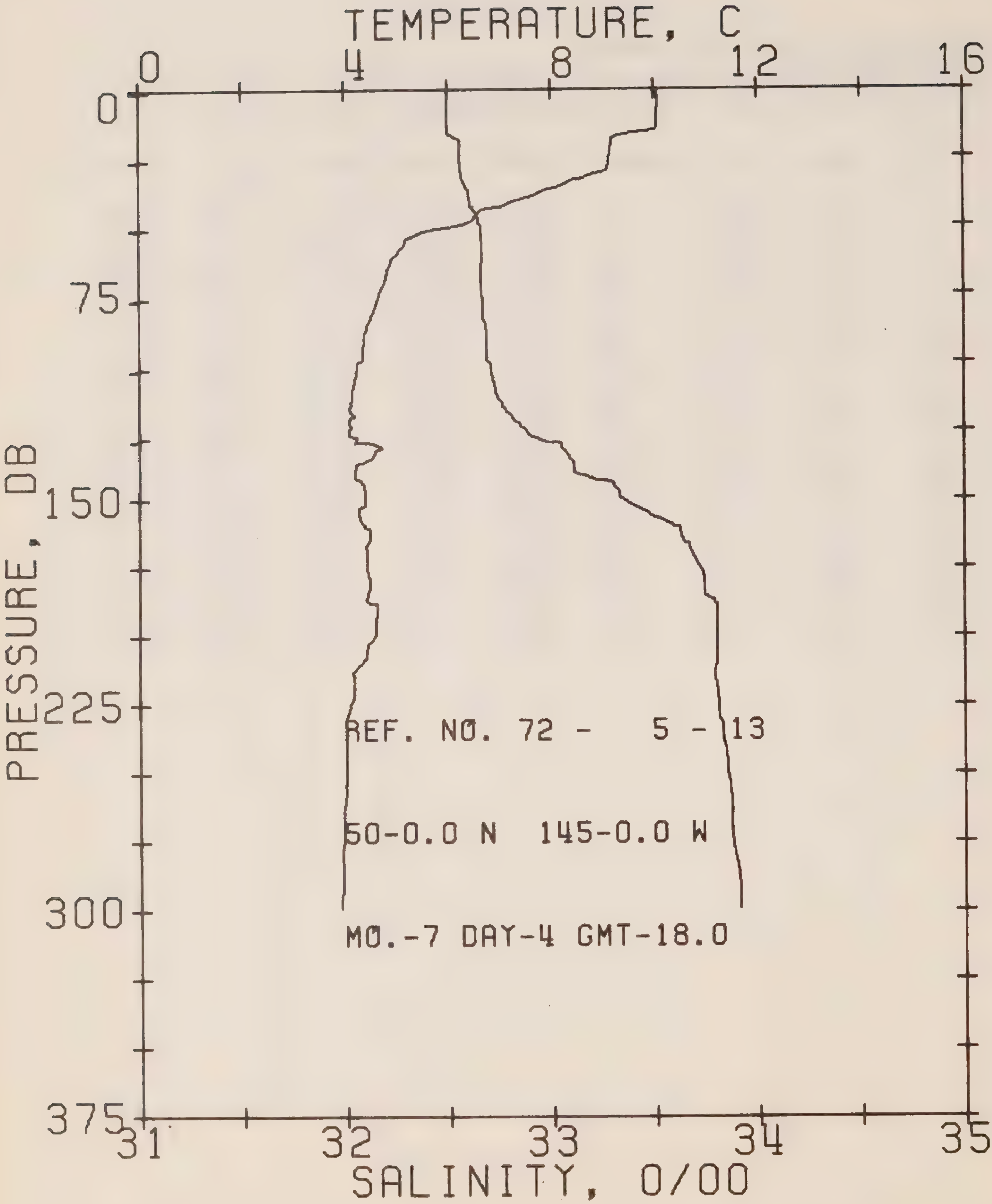
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 10 DATE 30/ 6/72
POSITION 50- 0.0N, 145- 0.0W GMT 17.5
RESULTS OF STP CAST 162 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	9.45	32.55	0	25.15	282.0	0.0	0.0	1485.
10	9.36	32.55	10	25.17	280.9	0.28	0.01	1485.
20	9.35	32.55	20	25.17	281.0	0.56	0.06	1485.
30	7.72	32.59	30	25.45	254.7	0.83	0.13	1479.
50	5.77	32.63	50	25.74	227.2	1.32	0.32	1472.
75	4.94	32.66	75	25.85	216.4	1.86	0.67	1469.
100	4.48	32.68	99	25.92	210.3	2.40	1.15	1467.
125	4.16	33.10	124	26.29	175.7	2.90	1.72	1467.
150	4.53	33.65	149	26.69	138.2	3.27	2.24	1470.
175	4.55	33.75	174	26.76	131.4	3.61	2.80	1470.
200	4.32	33.79	199	26.81	126.4	3.93	3.41	1470.
225	4.22	33.82	223	26.85	123.1	4.24	4.08	1470.
250	4.02	33.85	248	26.89	119.0	4.54	4.82	1469.


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 5 - 12
50-0.0 N 145-0.0 W
MO.-7 DAY-1 GMT-21.2
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 12 DATE 1/ 7/72
POSITION 50- 0.0N. 145- 0.0W GMT 21.2
RESULTS OF STP CAST 247 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	9.77	32.53	0	25.09	288.3	0.0	0.0	1486.
10	9.39	32.54	10	25.16	282.1	0.29	0.01	1485.
20	9.18	32.55	20	25.20	278.5	0.57	0.06	1485.
30	7.43	32.60	30	25.49	250.4	0.83	0.13	1478.
50	5.40	32.68	50	25.82	219.6	1.30	0.31	1470.
75	4.75	32.67	75	25.88	213.6	1.84	0.66	1468.
100	4.17	32.71	99	25.98	204.6	2.37	1.13	1466.
125	4.21	33.35	124	26.48	157.4	2.83	1.66	1468.
150	4.53	33.69	149	26.72	135.0	3.19	2.16	1470.
175	4.55	33.78	174	26.78	129.1	3.52	2.71	1470.
200	4.32	33.81	199	26.83	125.0	3.84	3.32	1470.
225	4.05	33.83	223	26.87	120.9	4.15	3.98	1469.
250	3.98	33.85	248	26.90	118.3	4.45	4.71	1469.
300	3.92	33.92	298	26.96	113.1	5.03	6.34	1470.
400	3.88	34.03	397	27.05	105.3	6.11	10.20	1472.
500	3.68	34.13	496	27.15	96.4	7.12	14.80	1473.
600	3.51	34.22	595	27.24	89.2	8.05	20.01	1474.
800	3.15	34.32	793	27.35	79.0	9.73	32.00	1475.
1000	2.86	34.39	990	27.44	71.6	11.23	45.75	1478.
1200	2.60	34.46	1188	27.51	65.2	12.60	61.04	1480.


TEMPERATURE, C
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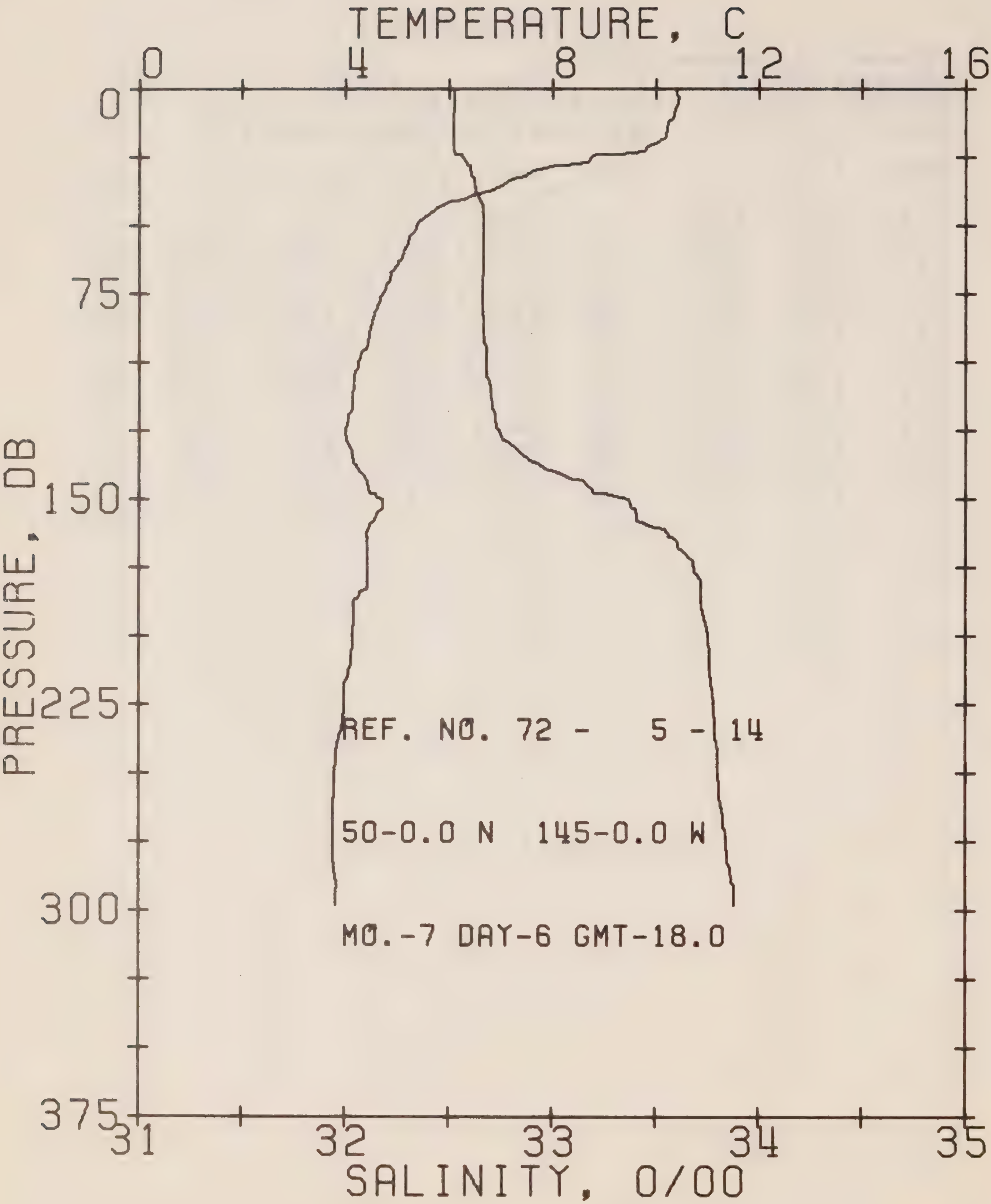
4
8
12
16
0
75
150
225
300
375
PRESSURE, DB
REF. NO. 72 - 5 - 13
50-0.0 N 145-0.0 W
MO.-7 DAY-4 GMT-18.0
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 13 DATE 4/ 7/72
POSITION 50- 0.0N, 145- 0.0W GMT 18.0
RESULTS OF STP CAST 165 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	10.05	32.50	0	25.02	295.0	0.0	0.0	1487.
10	10.06	32.50	10	25.02	295.6	0.30	0.02	1488.
20	9.17	32.56	20	25.21	277.6	0.58	0.06	1485.
30	9.06	32.56	30	25.22	276.1	0.86	0.13	1484.
50	6.16	32.66	50	25.71	229.9	1.36	0.33	1473.
75	4.65	32.66	75	25.89	213.1	1.90	0.68	1468.
100	4.25	32.70	99	25.96	206.5	2.43	1.14	1466.
125	4.08	32.88	124	26.12	191.5	2.93	1.72	1466.
150	4.40	33.35	149	26.46	159.6	3.37	2.33	1469.
175	4.43	33.72	174	26.75	132.3	3.73	2.92	1470.
200	4.55	33.80	199	26.80	127.8	4.05	3.54	1471.
225	4.07	33.81	223	26.86	122.3	4.36	4.21	1469.
250	4.00	33.85	248	26.90	118.8	4.66	4.94	1469.


TEMPERATURE, C
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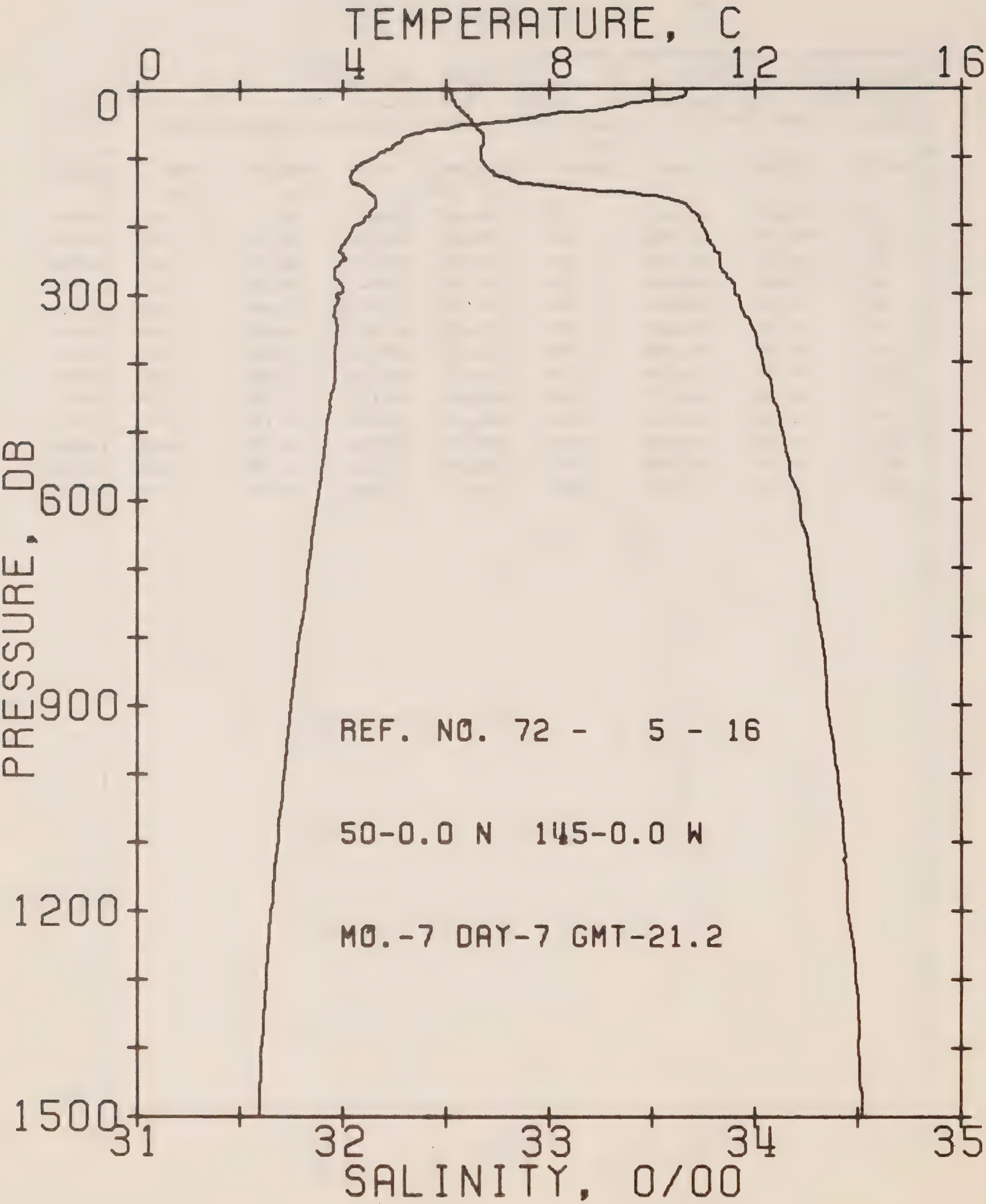
4
8
12
16
0
75
150
225
300
375
PRESSURE, DB
REF. NO. 72 - 5 - 14
50-0.0 N 145-0.0 W
MO.-7 DAY-6 GMT-18.0
31
32
33
34
35
SALINITY, 0/00

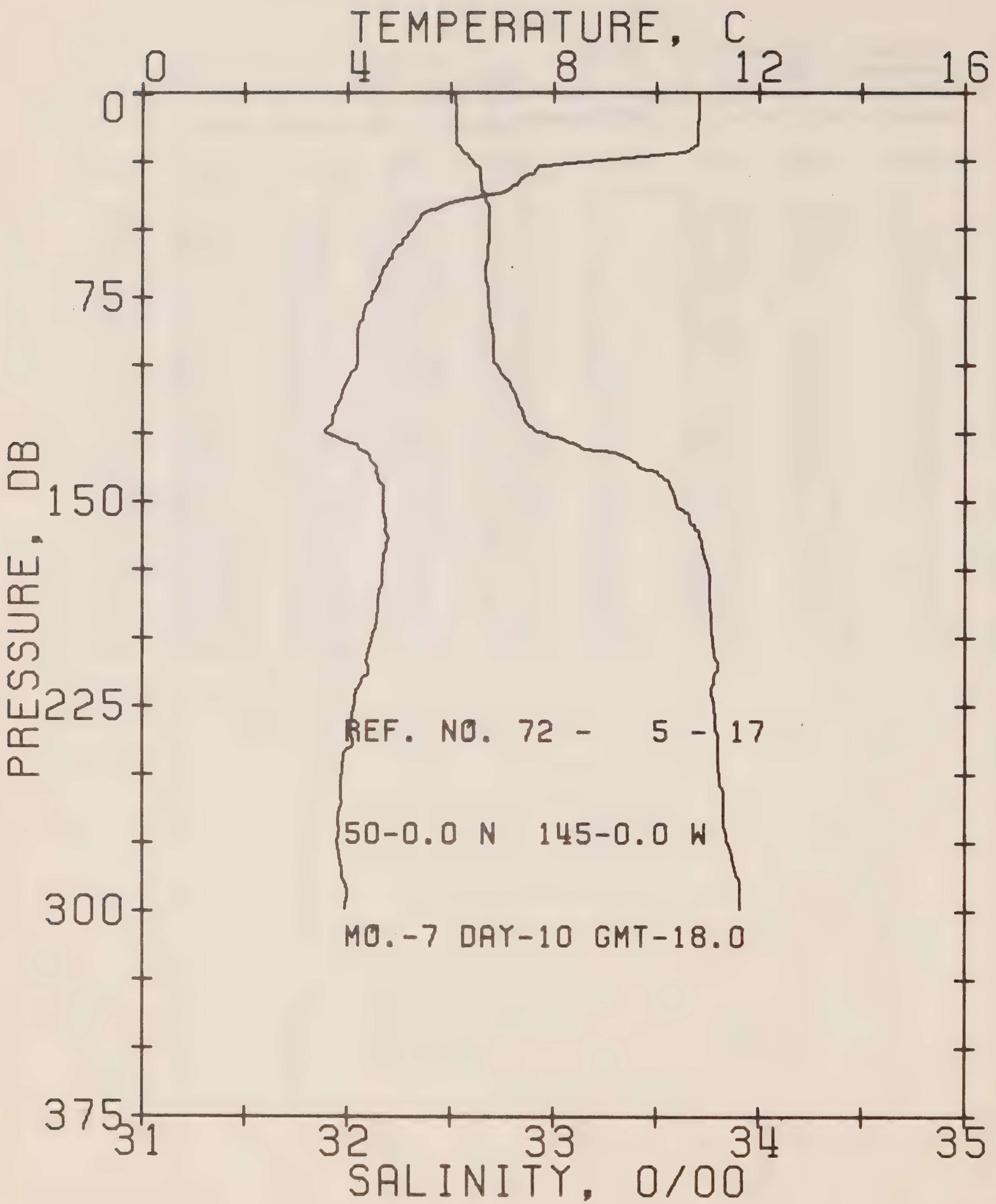
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 14 DATE 6/ 7/72
POSITION 50- 0.0N, 145- 0.0W GMT 18.0
RESULTS OF STP CAST 149 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	10.40	32.53	0	24.98	298.4	0.0	0.0	1489.
10	10.33	32.52	10	24.99	298.3	0.30	0.02	1489.
20	10.01	32.52	20	25.04	293.5	0.60	0.06	1488.
30	7.59	32.60	30	25.47	252.3	0.87	0.13	1479.
50	5.36	32.67	50	25.81	219.9	1.34	0.32	1470.
75	4.71	32.66	75	25.88	213.9	1.88	0.66	1468.
100	4.24	32.68	99	25.94	207.9	2.41	1.13	1466.
125	4.00	32.74	124	26.02	201.2	2.92	1.72	1466.
150	4.69	33.37	149	26.44	161.2	3.39	2.37	1470.
175	4.43	33.68	174	26.72	134.9	3.75	2.98	1470.
200	4.14	33.75	199	26.80	127.3	4.08	3.61	1469.
225	3.98	33.78	223	26.84	123.6	4.39	4.28	1469.
250	3.80	33.80	248	26.88	120.3	4.70	5.02	1468.


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 5 - 16
50-0.0 N 145-0.0 W
MO.-7 DAY-7 GMT-21.2
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 16 DATE 7/ 7/72
POSITICN 50- 0.0N, 145- 0.0W GMT 21.2
RESULTS OF STP CAST 249 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	10.63	32.52	0	24.93	302.9	0.0	0.0	1490.
10	10.63	32.53	10	24.94	302.6	0.30	0.02	1490.
20	9.67	32.54	20	25.11	286.7	0.60	0.06	1486.
30	9.00	32.57	30	25.24	274.5	0.88	0.13	1484.
50	6.77	32.63	50	25.61	239.6	1.39	0.34	1476.
75	5.14	32.68	75	25.85	217.1	1.96	0.70	1470.
100	4.61	32.67	99	25.90	212.4	2.49	1.18	1468.
125	4.15	32.73	124	25.99	203.4	3.01	1.77	1466.
150	4.49	33.24	149	26.36	168.8	3.49	2.44	1469.
175	4.56	33.68	174	26.70	136.7	3.86	3.04	1470.
200	4.23	33.74	199	26.79	128.9	4.19	3.68	1469.
225	4.02	33.78	223	26.84	124.0	4.50	4.36	1469.
250	4.06	33.83	248	26.87	120.9	4.81	5.09	1470.
300	3.88	33.90	298	26.95	114.3	5.39	6.73	1470.
400	3.85	34.03	397	27.06	104.6	6.48	10.60	1471.
500	3.67	34.13	496	27.15	96.6	7.48	15.20	1472.
600	3.49	34.21	595	27.24	89.1	8.41	20.41	1473.
800	3.15	34.32	793	27.35	78.8	10.09	32.35	1475.
1000	2.85	34.40	990	27.44	71.1	11.59	46.11	1478.
1200	2.60	34.45	1188	27.51	65.7	12.95	61.35	1480.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12
16
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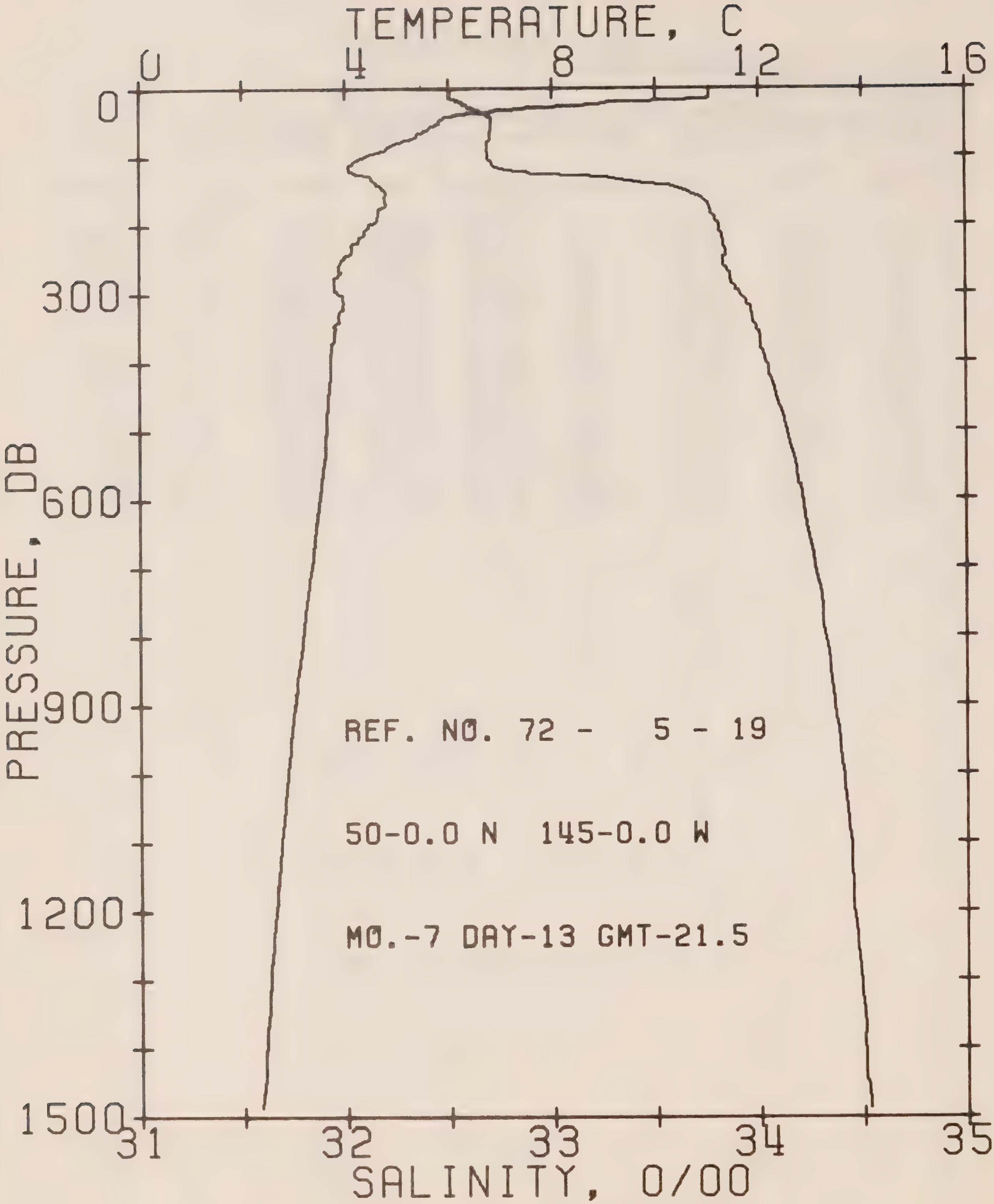
75
150
225
300
375
PRESSURE, DB
REF. NO. 72 - 5 - 17
50-0.0 N 145-0.0 W
MO.-7 DAY-10 GMT-18.0
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 17 DATE 10/ 7/72
POSITION 50- 0.0N, 145- 0.0W GMT 18.0
RESULTS OF STP CAST 165 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	10.83	32.52	0	24.90	306.2	0.0	0.0	1490.
10	10.82	32.53	10	24.91	305.7	0.31	0.02	1490.
20	10.72	32.54	20	24.94	303.5	0.61	0.06	1490.
30	7.56	32.64	30	25.51	248.9	0.88	0.13	1479.
50	5.24	32.69	50	25.84	217.1	1.35	0.32	1470.
75	4.46	32.68	75	25.92	209.9	1.88	0.66	1467.
100	4.15	32.72	99	25.98	204.0	2.40	1.12	1466.
125	3.61	32.96	124	26.23	180.9	2.88	1.67	1464.
150	4.68	33.59	149	26.62	144.4	3.27	2.22	1470.
175	4.67	33.75	174	26.75	132.7	3.62	2.79	1471.
200	4.46	33.77	199	26.79	128.9	3.95	3.42	1470.
225	4.11	33.78	223	26.83	124.9	4.26	4.10	1469.
250	3.88	33.81	248	26.87	120.8	4.57	4.85	1469.


TEMPERATURE, C
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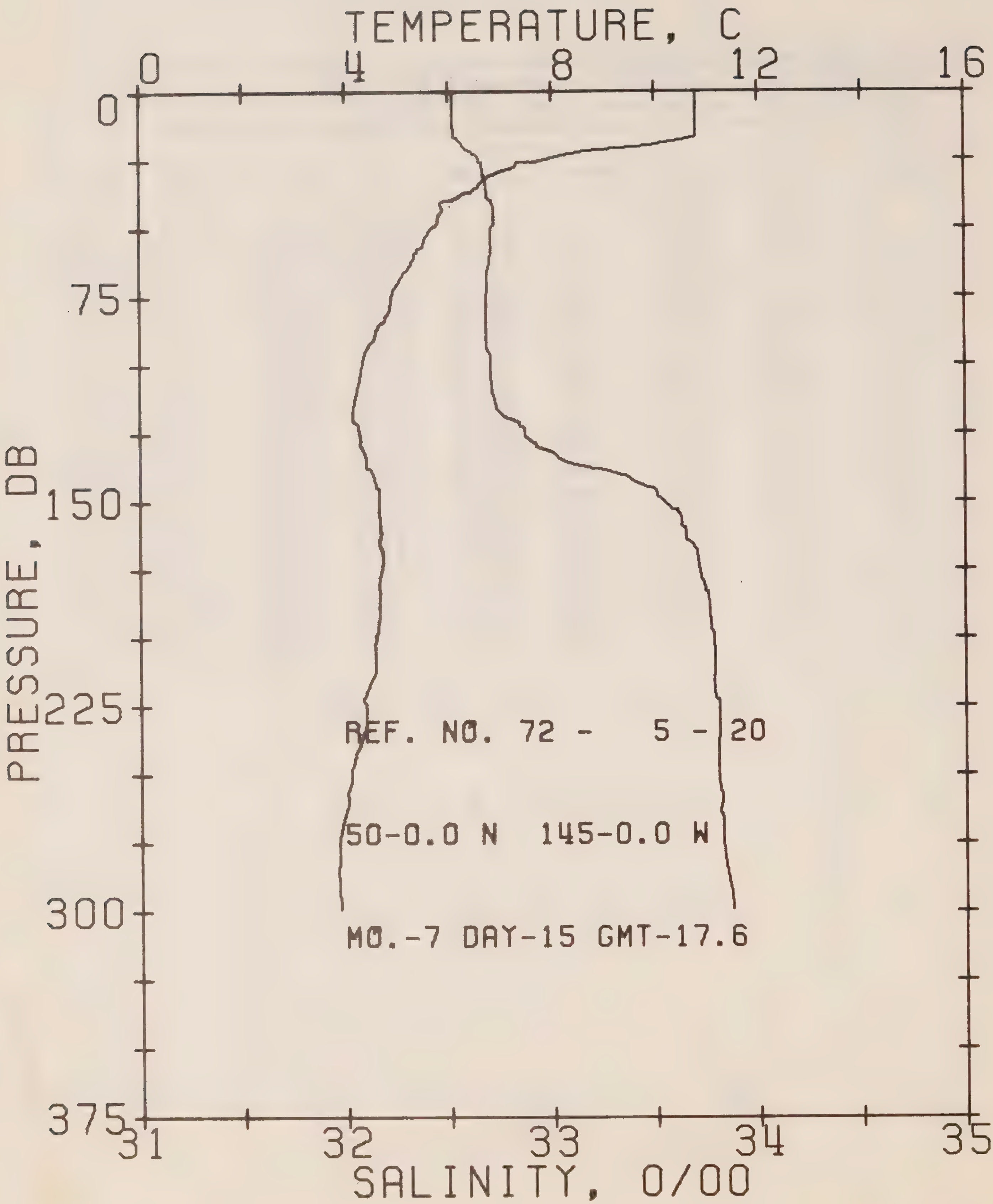
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 5 - 19
50-0.0 N 145-0.0 W
MO.-7 DAY-13 GMT-21.5
31
32
33
34
35
SALINITY, 0/00

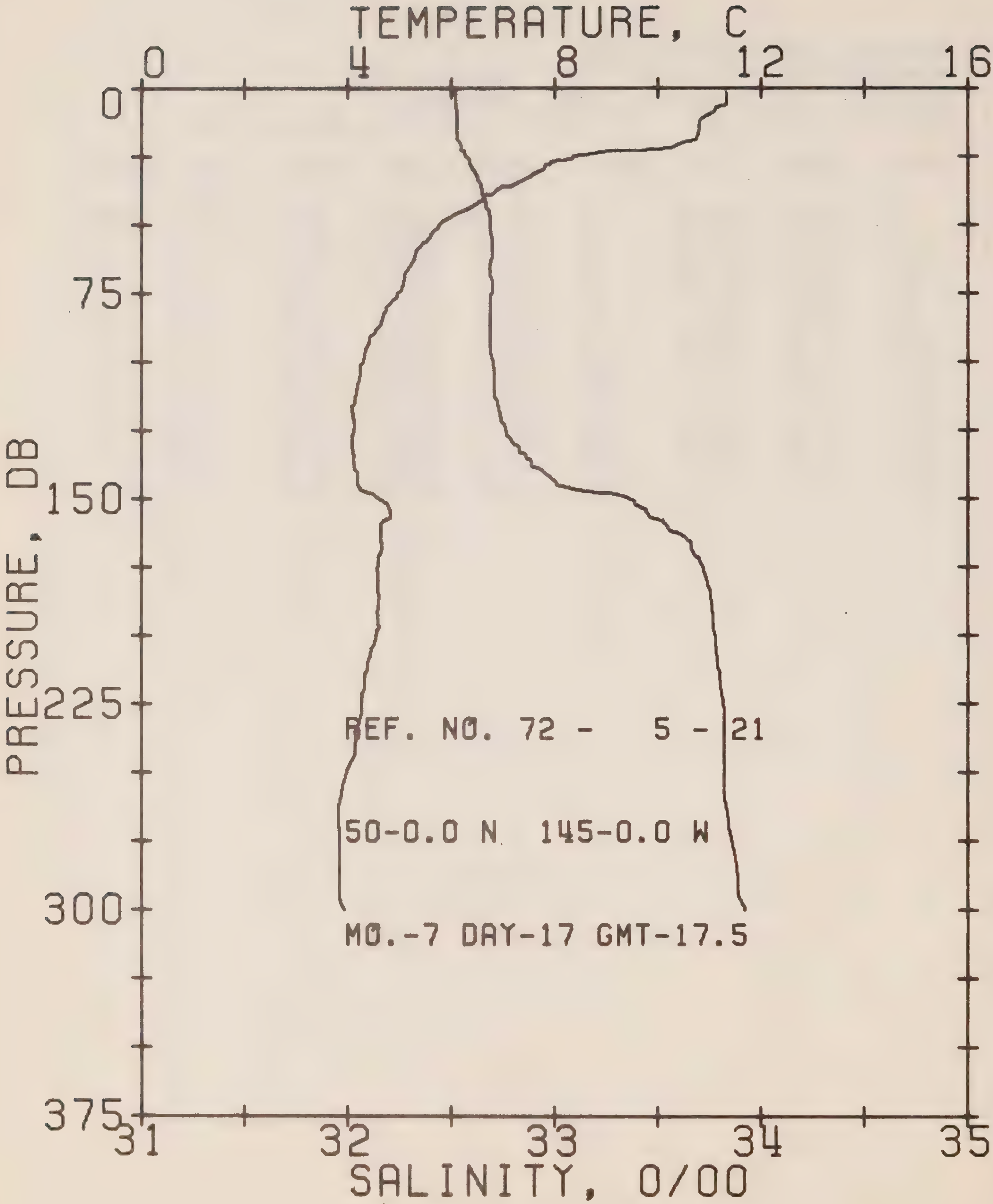
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 19   DATE 13/ 7/72
POSITION 50- 0.0N. 145- 0.0W   GMT 21.5
RESULTS OF STP CAST   258 POINTS TAKEN FROM ANALCG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	11.05	32.50	0	24.85	311.4	0.0	0.0	1491.
10	11.04	32.51	10	24.85	311.0	0.31	0.02	1491.
20	9.78	32.56	20	25.11	286.9	0.62	0.06	1487.
30	7.38	32.62	30	25.52	248.0	0.88	0.13	1478.
50	5.80	32.71	50	25.79	221.9	1.35	0.32	1472.
75	5.26	32.70	75	25.85	216.8	1.89	0.67	1470.
100	4.39	32.69	99	25.94	208.6	2.43	1.14	1467.
125	4.21	32.90	124	26.12	191.2	2.93	1.72	1467.
150	4.77	33.65	149	26.66	141.0	3.33	2.28	1471.
175	4.72	33.76	174	26.75	132.6	3.67	2.84	1471.
200	4.46	33.80	199	26.81	126.6	4.00	3.46	1470.
225	4.24	33.83	223	26.86	122.6	4.31	4.14	1470.
250	3.95	33.83	248	26.89	119.8	4.61	4.87	1469.
300	3.86	33.91	298	26.96	113.2	5.20	6.50	1470.
400	3.72	34.03	397	27.07	103.5	6.27	10.35	1471.
500	3.62	34.13	496	27.16	95.8	7.27	14.90	1472.
600	3.49	34.21	595	27.23	89.3	8.19	20.08	1473.
800	3.16	34.32	793	27.35	79.3	9.87	32.00	1475.
1000	2.85	34.40	990	27.45	70.7	11.37	45.69	1478.
1200	2.62	34.45	1188	27.51	65.8	12.72	60.89	1480.


TEMPERATURE, C
0
4
8
12
16
0
75
150
225
300
375
PRESSURE, DB
REF. NO. 72 - 5 - 20
50-0.0 N 145-0.0 W
MO.-7 DAY-15 GMT-17.6
31
32
33
34
35
SALINITY, 0/00

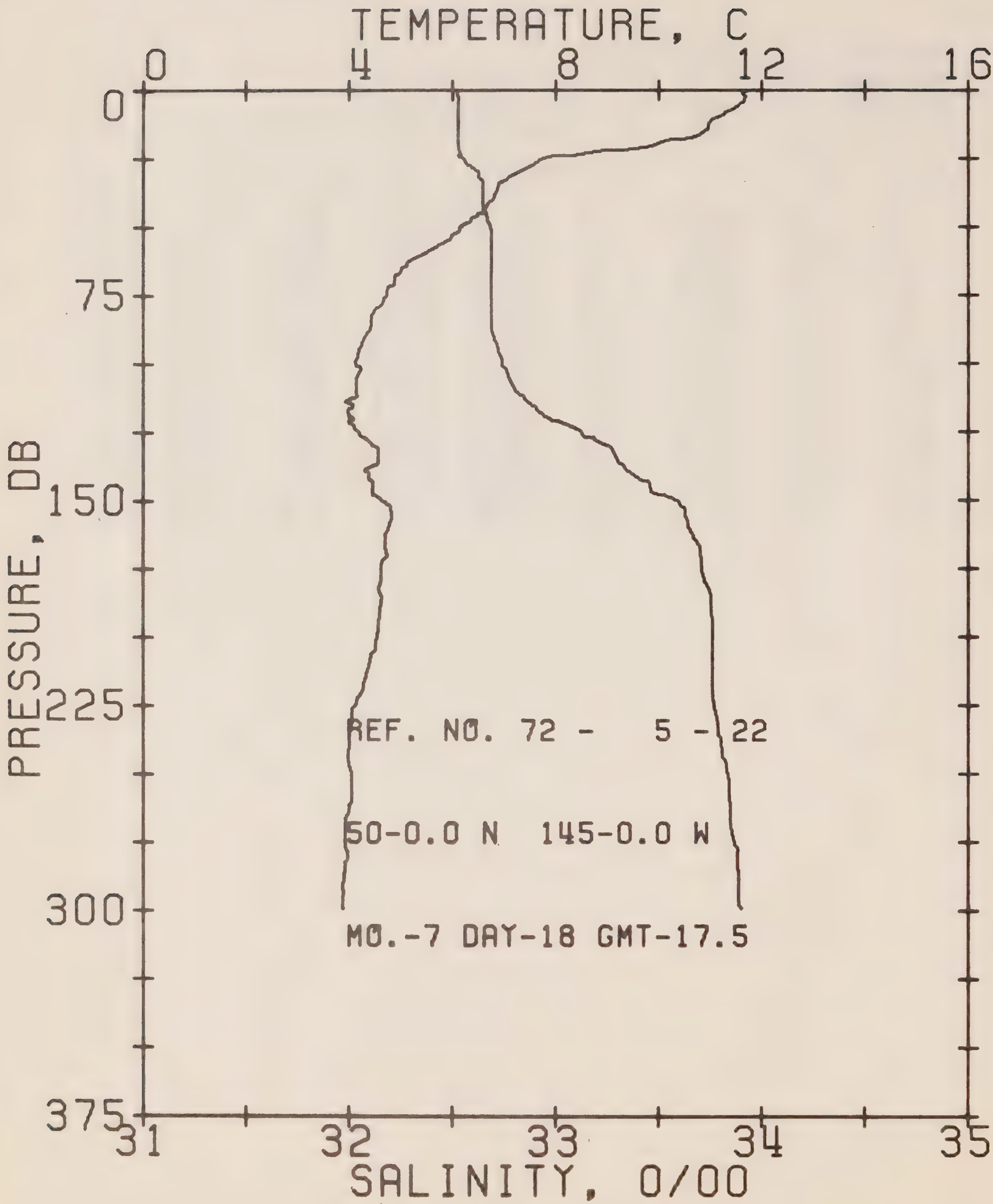
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 20 DATE 15/ 7/72
POSITION 50- 0.0N, 145- 0.0W GMT 17.6
RESULTS OF STP CAST 173 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	10.81	32.52	0	24.90	305.9	0.0	0.0	1490.
10	10.80	32.52	10	24.91	306.1	0.31	0.02	1490.
20	9.90	32.57	20	25.10	288.0	0.61	0.06	1487.
30	6.92	32.67	30	25.62	238.3	0.86	0.13	1476.
50	5.69	32.71	50	25.81	220.6	1.32	0.31	1472.
75	4.89	32.68	75	25.88	214.3	1.86	0.66	1469.
100	4.30	32.70	99	25.95	207.0	2.39	1.13	1467.
125	4.28	32.87	124	26.09	194.2	2.89	1.71	1467.
150	4.63	33.54	149	26.59	147.6	3.32	2.31	1470.
175	4.68	33.71	174	26.72	135.7	3.67	2.88	1471.
200	4.58	33.78	199	26.78	129.7	4.00	3.52	1471.
225	4.38	33.81	223	26.83	125.5	4.32	4.21	1471.
250	4.07	33.80	248	26.85	123.3	4.64	4.96	1470.


TEMPERATURE, C
0
4
8
12
16
0
75
150
225
300
375
PRESSURE, DB
REF. NO. 72 - 5 - 21
50-0.0 N 145-0.0 W
MO.-7 DAY-17 GMT-17.5
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 21   DATE 17/ 7/72
POSITION 50- 0.0N, 145- 0.0W   GMT 17.5
RESULTS OF STP CAST   170 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	11.23	32.52	0	24.83	313.0	0.0	0.0	1492.
10	10.92	32.53	10	24.89	307.4	0.31	0.02	1491.
20	10.45	32.54	20	24.98	299.1	0.62	0.06	1489.
30	7.75	32.60	30	25.45	254.4	0.89	0.13	1479.
50	5.76	32.69	50	25.78	223.0	1.36	0.32	1472.
75	4.96	32.70	75	25.88	213.6	1.91	0.67	1469.
100	4.29	32.70	99	25.95	206.9	2.43	1.14	1467.
125	4.10	32.76	124	26.02	200.7	2.94	1.72	1466.
150	4.62	33.36	149	26.44	161.1	3.42	2.38	1470.
175	4.56	33.71	174	26.73	134.3	3.78	2.99	1470.
200	4.55	33.78	199	26.78	129.6	4.11	3.62	1471.
225	4.27	33.82	223	26.84	124.0	4.43	4.30	1470.
250	3.97	33.82	248	26.88	120.7	4.73	5.04	1469.
300	3.94	33.92	298	26.96	113.3	5.32	6.68	1470.


TEMPERATURE, C
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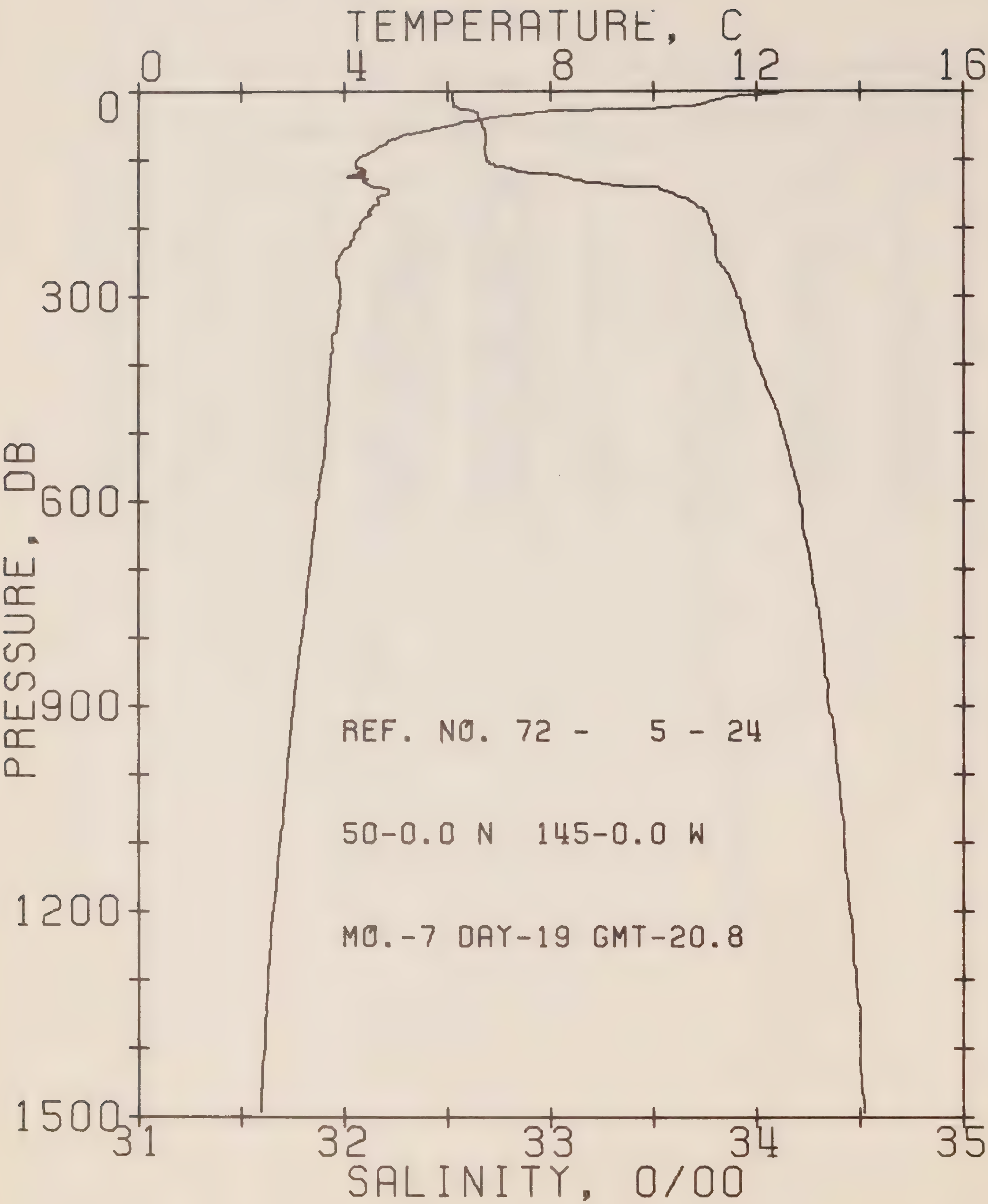
4
8
12
16
0
75
150
225
300
375
PRESSURE, DB
REF. NO. 72 - 5 - 22
50-0.0 N 145-0.0 W
MO.-7 DAY-18 GMT-17.5
31
32
33
34
35
SALINITY, 0/00

CFFSHCRE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 22 DATE 18/ 7/72
POSITICN 50- 0.0N, 145- 0.0W GMT 17.5
RESULTS OF STP CAST 178 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	11.59	32.52	0	24.76	319.1	0.0	0.0	1493.
10	11.13	32.53	10	24.86	310.9	0.32	0.02	1491.
20	9.92	32.53	20	25.06	291.3	0.62	0.06	1487.
30	7.28	32.63	30	25.54	245.9	0.89	0.13	1478.
50	6.12	32.68	50	25.73	227.9	1.36	0.32	1473.
75	4.72	32.69	75	25.90	211.8	1.91	0.67	1468.
100	4.13	32.74	99	26.00	202.3	2.42	1.13	1466.
125	4.18	33.12	124	26.30	174.4	2.90	1.68	1467.
150	4.65	33.59	149	26.62	144.2	3.31	2.24	1470.
175	4.61	33.71	174	26.72	135.C	3.66	2.82	1471.
200	4.53	33.76	199	26.77	130.6	3.99	3.45	1471.
225	4.C9	33.77	223	26.82	125.5	4.31	4.15	1469.
250	4.05	33.83	248	26.88	120.6	4.62	4.89	1470.


TEMPERATURE, C
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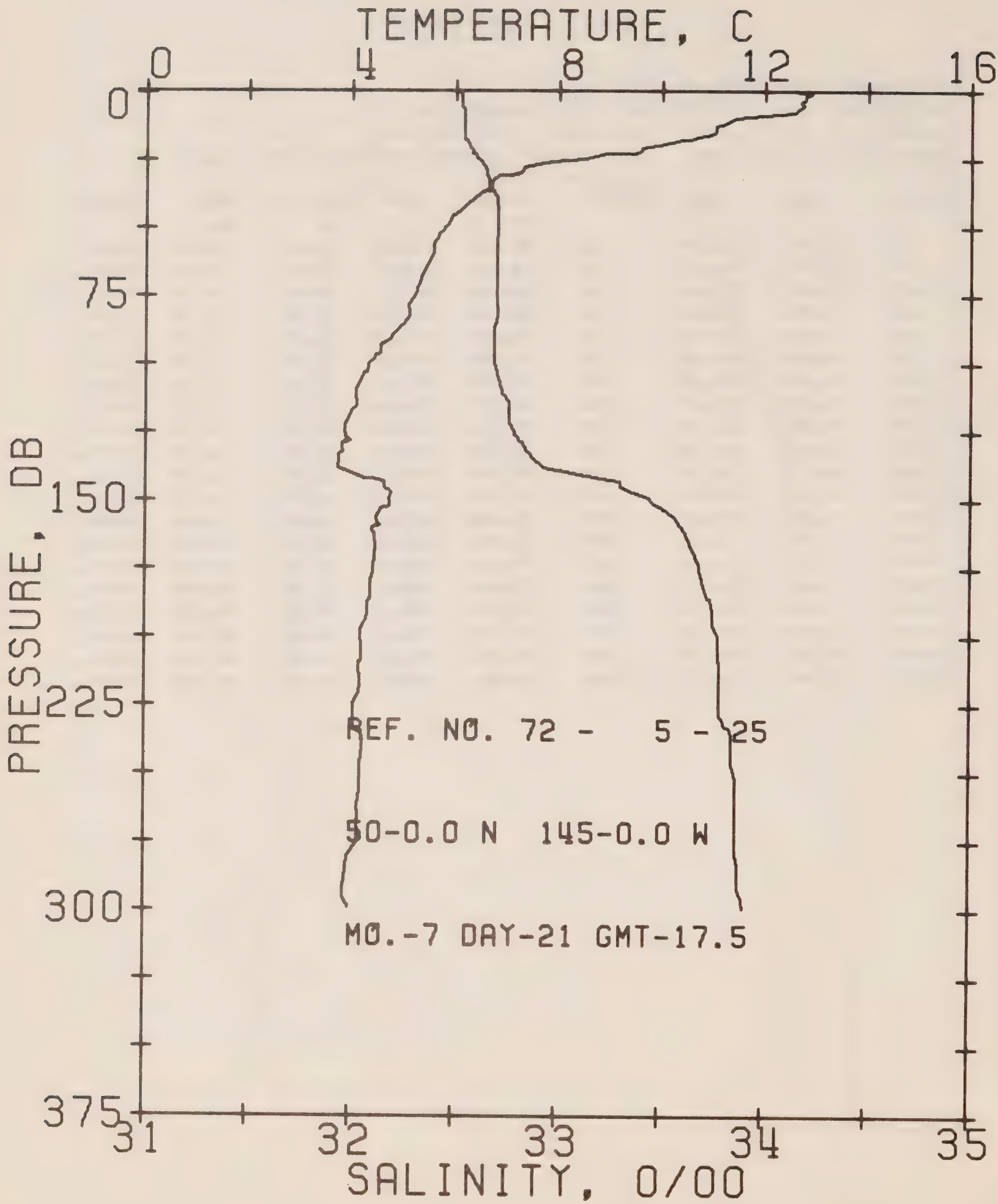
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 5 - 24
50-0.0 N 145-0.0 W
MO.-7 DAY-19 GMT-20.8
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 24 DATE 19/ 7/72
POSITION 50- 0.0N, 145- 0.0W GMT 20.8
RESULTS OF STP CAST 359 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	12.50	32.53	0	24.60	334.6	0.0	0.0	1496.
10	11.35	32.52	10	24.81	315.4	0.33	0.02	1492.
20	10.90	32.53	20	24.90	307.2	0.64	0.06	1491.
30	7.73	32.64	30	25.49	251.2	0.92	0.14	1479.
50	6.08	32.67	50	25.73	228.2	1.40	0.33	1473.
75	4.83	32.69	75	25.89	212.9	1.95	0.68	1468.
100	4.24	32.69	99	25.95	207.1	2.47	1.15	1466.
125	4.05	33.07	124	26.27	176.9	2.97	1.71	1467.
150	4.85	33.60	149	26.61	145.6	3.38	2.28	1471.
175	4.50	33.74	174	26.76	131.6	3.72	2.85	1470.
200	4.30	33.78	199	26.81	126.7	4.04	3.47	1470.
225	4.10	33.80	223	26.85	123.3	4.35	4.14	1469.
250	3.85	33.81	248	26.88	120.2	4.66	4.88	1469.
300	3.92	33.90	298	26.94	114.6	5.24	6.51	1470.
400	3.73	34.00	397	27.05	105.7	6.34	10.42	1471.
500	3.62	34.13	496	27.16	95.9	7.35	15.03	1472.
600	3.45	34.21	595	27.24	88.9	8.27	20.21	1473.
800	3.16	34.32	793	27.35	79.4	9.96	32.20	1475.
1000	2.88	34.39	990	27.44	71.9	11.47	46.04	1478.
1200	2.60	34.45	1188	27.51	65.8	12.84	61.45	1480.


TEMPERATURE, C
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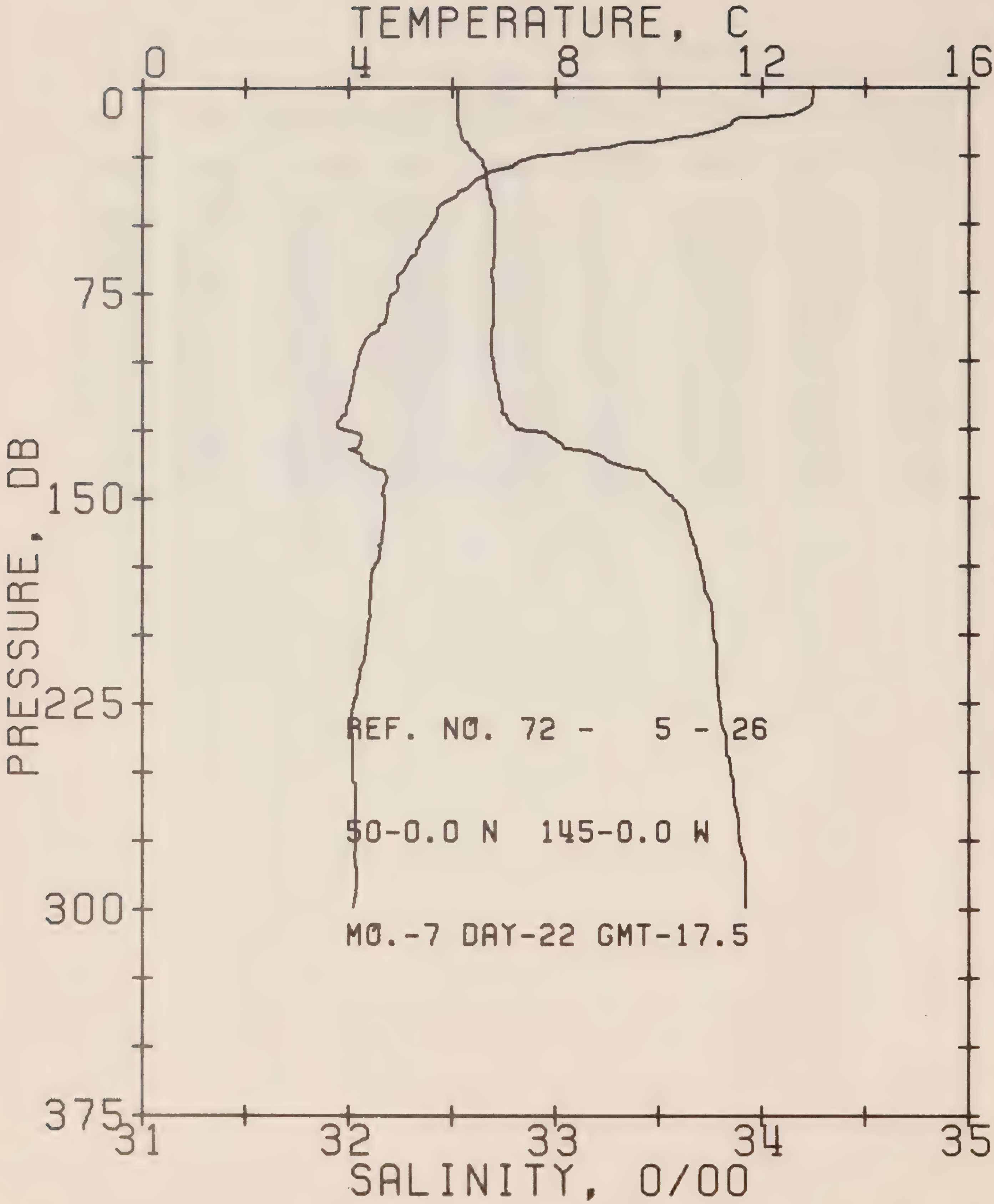
4
8
12
16
0
75
150
225
300
375
PRESSURE, DB
REF. NO. 72 - 5 - 25
50-0.0 N 145-0.0 W
MO.-7 DAY-21 GMT-17.5
31
32
33
34
35
SALINITY, 0/00

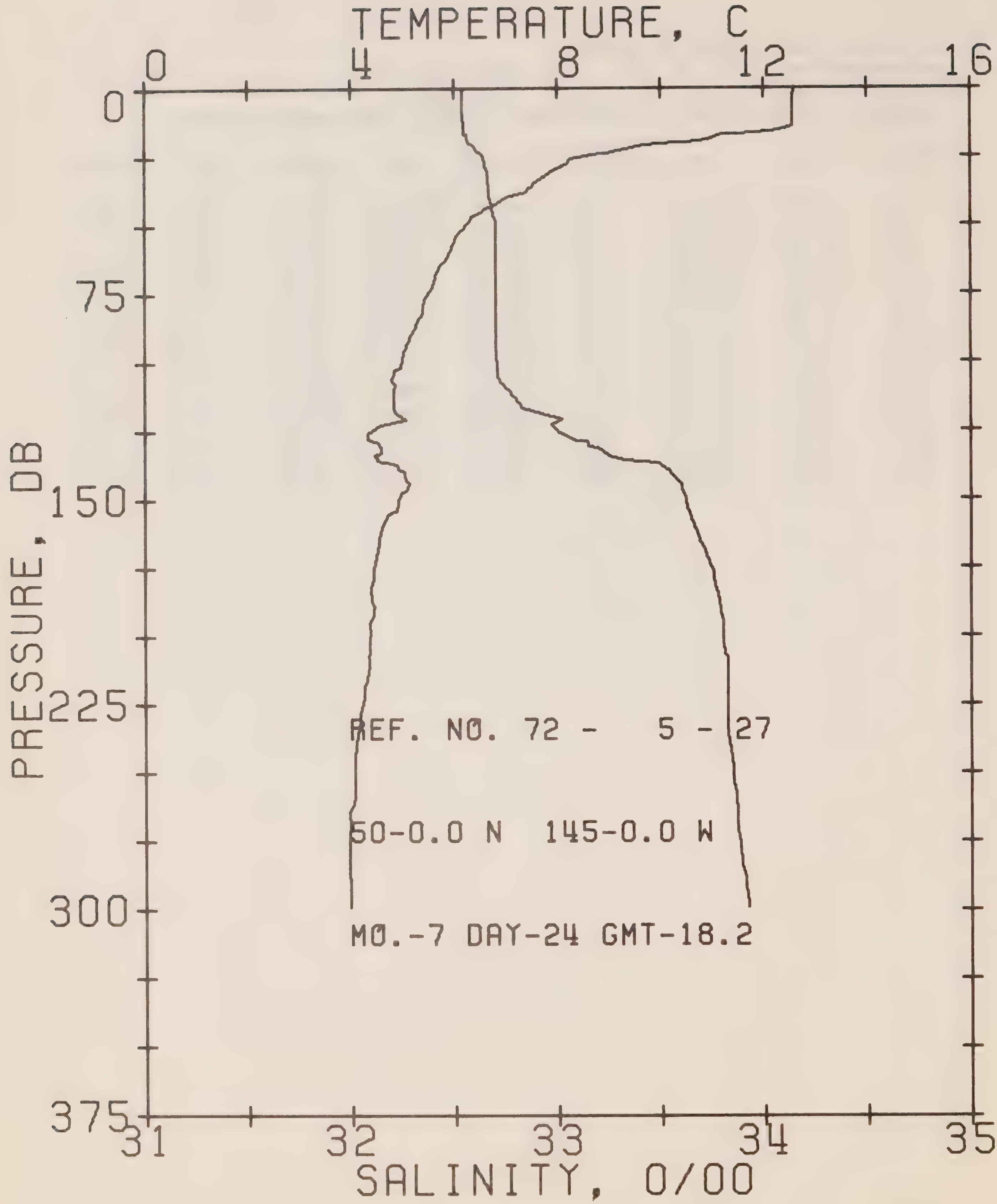
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 25 DATE 21/ 7/72
POSITION 50- 0.0N, 145- 0.0W GMT 17.5
RESULTS OF STP CAST 155 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	12.51	32.52	0	24.59	335.5	0.0	0.0	1496.
10	11.43	32.54	10	24.81	315.3	0.34	0.02	1493.
20	9.92	32.56	20	25.09	289.1	0.64	0.06	1487.
30	7.24	32.65	30	25.56	243.9	0.91	0.13	1477.
50	5.79	32.71	50	25.80	221.8	1.37	0.32	1472.
75	5.20	32.70	75	25.86	216.1	1.91	0.67	1470.
100	4.33	32.69	99	25.94	208.0	2.44	1.14	1467.
125	3.88	32.78	124	26.06	196.7	2.95	1.72	1465.
150	4.76	33.45	149	26.50	155.9	3.40	2.35	1470.
175	4.43	33.69	174	26.73	134.6	3.75	2.93	1470.
200	4.19	33.78	199	26.82	125.6	4.08	3.55	1469.
225	4.06	33.79	223	26.84	123.7	4.39	4.23	1469.
250	4.18	33.86	248	26.89	119.8	4.70	4.97	1470.


TEMPERATURE, C
0
4
8
12
16
0
75
150
225
300
375
PRESSURE, DB
REF. NO. 72 - 5 - 26
50-0.0 N 145-0.0 W
MO.-7 DAY-22 GMT-17.5
31
32
33
34
35
SALINITY, 0/00

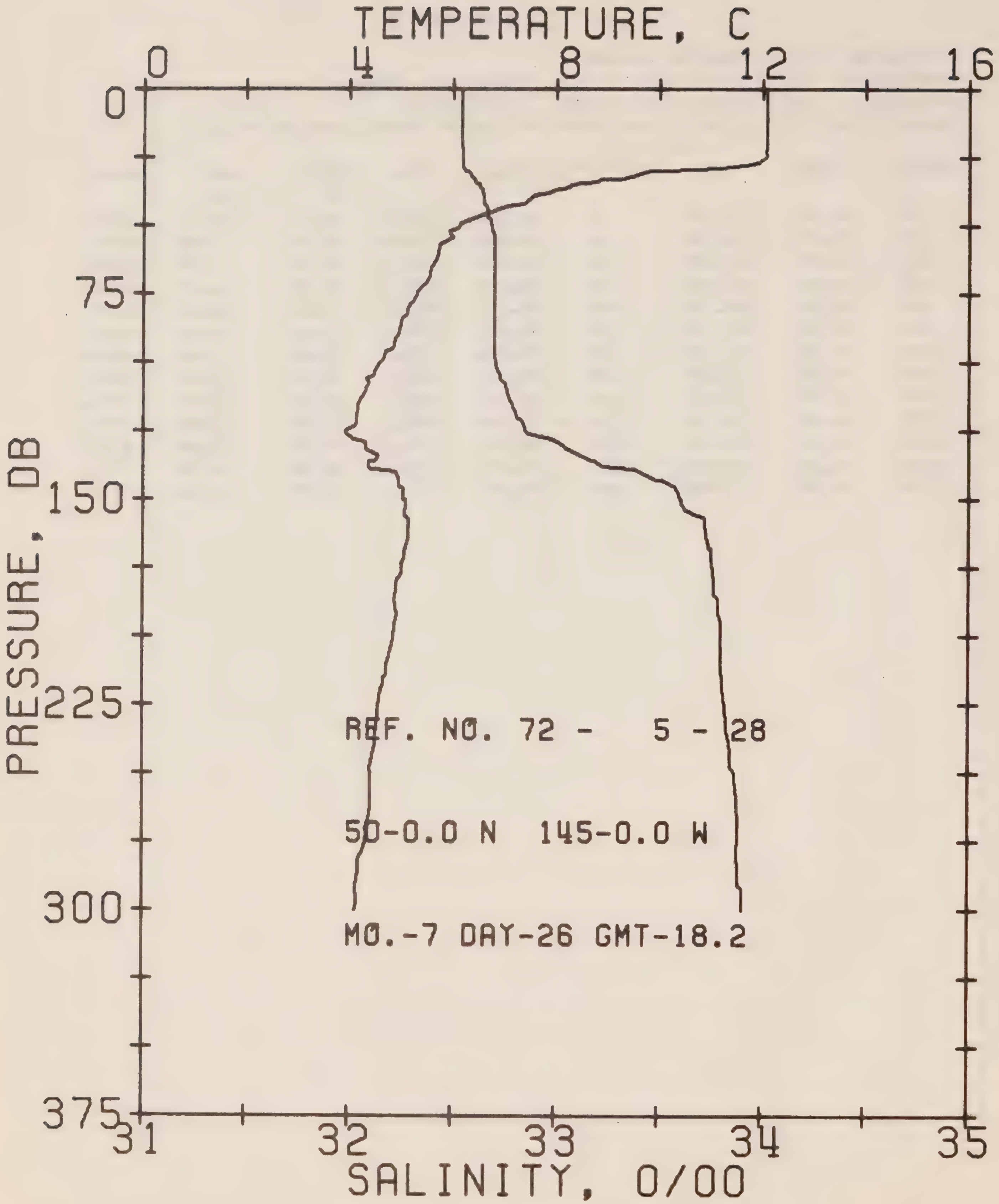
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 26 DATE 22/ 7/72
POSITION 50- 0.0N. 145- 0.0W GMT 17.5
RESULTS OF STP CAST 153 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	12.98	32.53	0	24.51	343.5	0.0	0.0	1498.
10	12.61	32.53	10	24.58	337.0	0.34	0.02	1497.
20	9.88	32.56	20	25.09	288.5	0.65	0.06	1487.
30	6.91	32.66	30	25.61	238.9	0.91	0.13	1476.
50	5.59	32.71	50	25.82	219.5	1.36	0.31	1471.
75	4.89	32.70	75	25.89	212.9	1.90	0.66	1469.
100	4.17	32.70	99	25.96	206.0	2.43	1.12	1466.
125	3.91	32.81	124	26.08	195.0	2.93	1.70	1466.
150	4.70	33.56	149	26.60	146.6	3.34	2.28	1470.
175	4.49	33.70	174	26.73	134.5	3.69	2.86	1470.
200	4.35	33.77	199	26.79	128.3	4.02	3.48	1470.
225	4.09	33.79	223	26.84	123.7	4.34	4.16	1469.
250	4.09	33.85	248	26.89	119.7	4.64	4.90	1470.


TEMPERATURE, C
0
4
8
12
16
0
75
150
225
300
375
PRESSURE, DB
REF. NO. 72 - 5 - 27
50-0.0 N 145-0.0 W
MO.-7 DAY-24 GMT-18.2
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 27 DATE 24/ 7/72
POSITION 50- 0.0N, 145- 0.0W GMT 18.2
RESULTS OF STP CAST 145 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	12.58	32.54	0	24.59	335.3	0.0	0.0	1496.
10	12.57	32.54	10	24.60	335.6	0.34	0.02	1497.
20	10.51	32.57	20	24.99	297.9	0.66	0.07	1489.
30	7.94	32.65	30	25.47	252.9	0.93	0.13	1480.
50	6.22	32.70	50	25.73	227.7	1.41	0.33	1474.
75	5.48	32.70	75	25.82	219.3	1.96	0.68	1471.
100	4.97	32.70	99	25.89	213.6	2.50	1.17	1469.
125	4.39	33.00	124	26.18	185.8	3.01	1.75	1468.
150	4.92	33.62	149	26.62	144.9	3.42	2.31	1471.
175	4.43	33.74	174	26.76	130.9	3.76	2.88	1470.
200	4.35	33.80	199	26.82	125.8	4.08	3.49	1470.
225	4.20	33.82	223	26.85	122.9	4.39	4.16	1470.
250	4.04	33.85	248	26.89	119.3	4.69	4.90	1470.


TEMPERATURE, C
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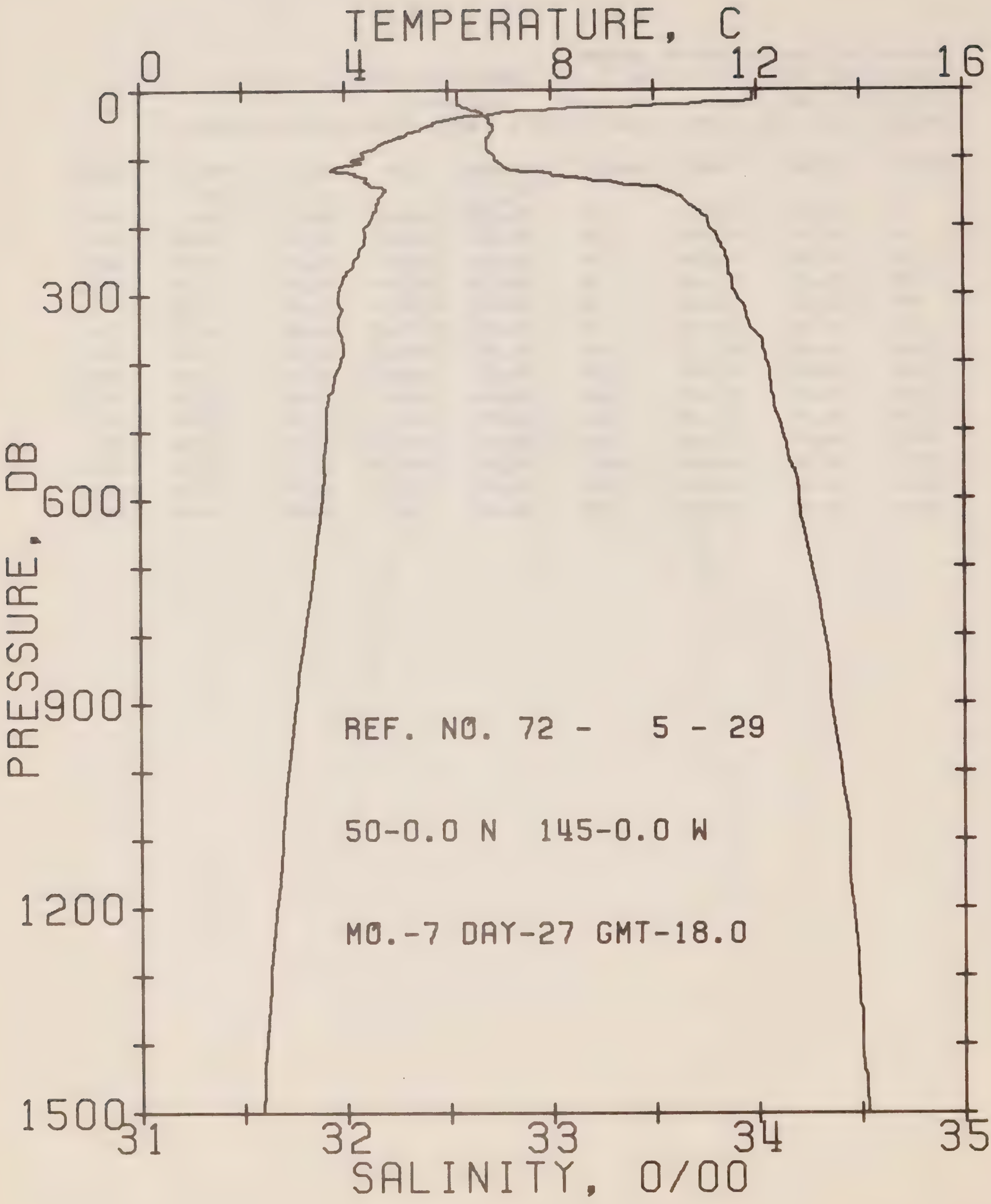
4
8
12
16
0
75
150
225
300
375
PRESSURE, DB
REF. NO. 72 - 5 - 28
50-0.0 N 145-0.0 W
MO.-7 DAY-26 GMT-18.2
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 28 DATE 26/ 7/72
POSITION 50- 0.0N. 145- 0.0W GMT 18.2
RESULTS OF STP CAST 145 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	12.09	32.54	0	24.69	326.5	0.0	0.0	1495.
10	12.09	32.54	10	24.69	326.9	0.33	0.02	1495.
20	12.09	32.54	20	24.69	327.1	0.65	0.07	1495.
30	10.12	32.56	30	25.05	292.5	0.98	0.15	1488.
50	6.10	32.68	50	25.74	227.4	1.48	0.35	1473.
75	5.29	32.70	75	25.85	217.2	2.03	0.70	1470.
100	4.60	32.71	99	25.93	209.2	2.56	1.18	1468.
125	3.93	32.85	124	26.11	192.2	3.07	1.76	1466.
150	5.05	33.60	149	26.59	147.8	3.49	2.34	1472.
175	5.01	33.75	174	26.71	136.0	3.84	2.92	1472.
200	4.85	33.80	199	26.77	131.2	4.17	3.56	1472.
225	4.57	33.82	223	26.81	126.9	4.49	4.26	1471.
250	4.42	33.87	248	26.87	121.7	4.81	5.01	1471.
300	4.11	33.91	298	26.93	115.9	5.40	6.68	1471.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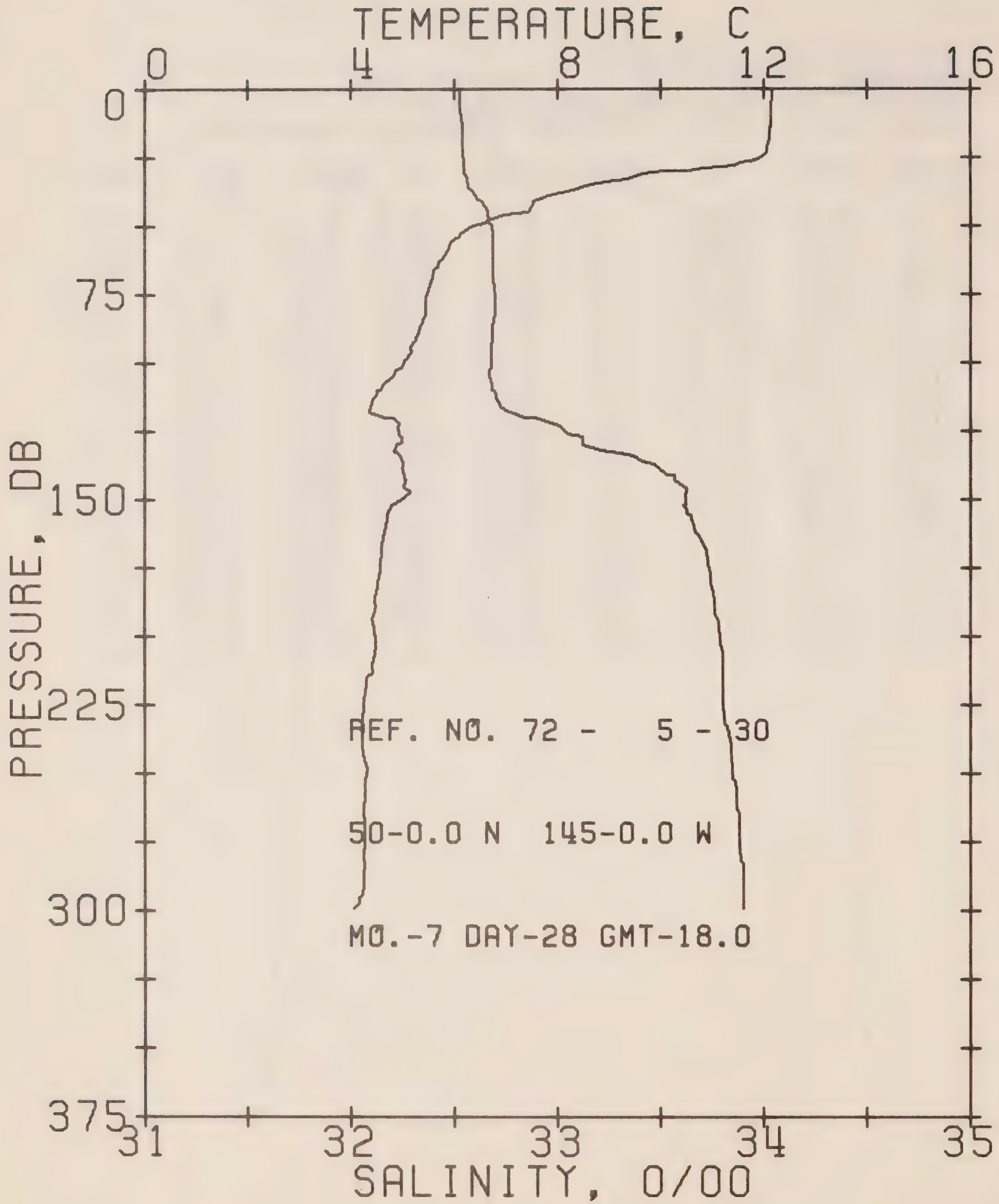
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 5 - 29
50-0.0 N 145-0.0 W
MO.-7 DAY-27 GMT-18.0
31
32
33
34
35
SALINITY, 0/00

CFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 29 DATE 27/ 7/72
POSITICN 50- 0.0N, 145- 0.0W GMT 18.0
RESULTS OF STP CAST 202 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	11.91	32.54	0	24.72	323.3	0.0	0.0	1494.
10	11.91	32.55	10	24.73	322.9	0.32	0.02	1494.
20	10.96	32.55	20	24.90	306.8	0.64	0.07	1491.
30	7.84	32.62	30	25.45	254.2	0.92	0.14	1480.
50	5.72	32.71	50	25.80	221.2	1.39	0.32	1472.
75	4.81	32.69	75	25.89	212.8	1.93	0.67	1468.
100	4.38	32.73	99	25.97	205.6	2.45	1.13	1467.
125	4.22	33.01	124	26.21	183.1	2.94	1.70	1467.
150	4.74	33.59	149	26.61	145.2	3.35	2.26	1471.
175	4.61	33.70	174	26.71	135.6	3.70	2.84	1471.
200	4.41	33.77	199	26.79	128.6	4.03	3.47	1470.
225	4.36	33.82	223	26.83	124.7	4.34	4.16	1470.
250	4.19	33.86	248	26.88	120.3	4.65	4.90	1470.
300	3.86	33.89	298	26.95	114.4	5.24	6.54	1470.
400	3.90	34.04	397	27.06	104.5	6.33	10.42	1472.
500	3.62	34.12	496	27.15	96.6	7.33	15.02	1472.
600	3.53	34.20	595	27.22	90.4	8.26	20.24	1474.
800	3.19	34.32	793	27.35	79.0	9.96	32.32	1476.
1000	2.86	34.40	990	27.45	70.9	11.46	46.07	1478.
1200	2.63	34.46	1188	27.51	65.5	12.82	61.29	1480.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12
16
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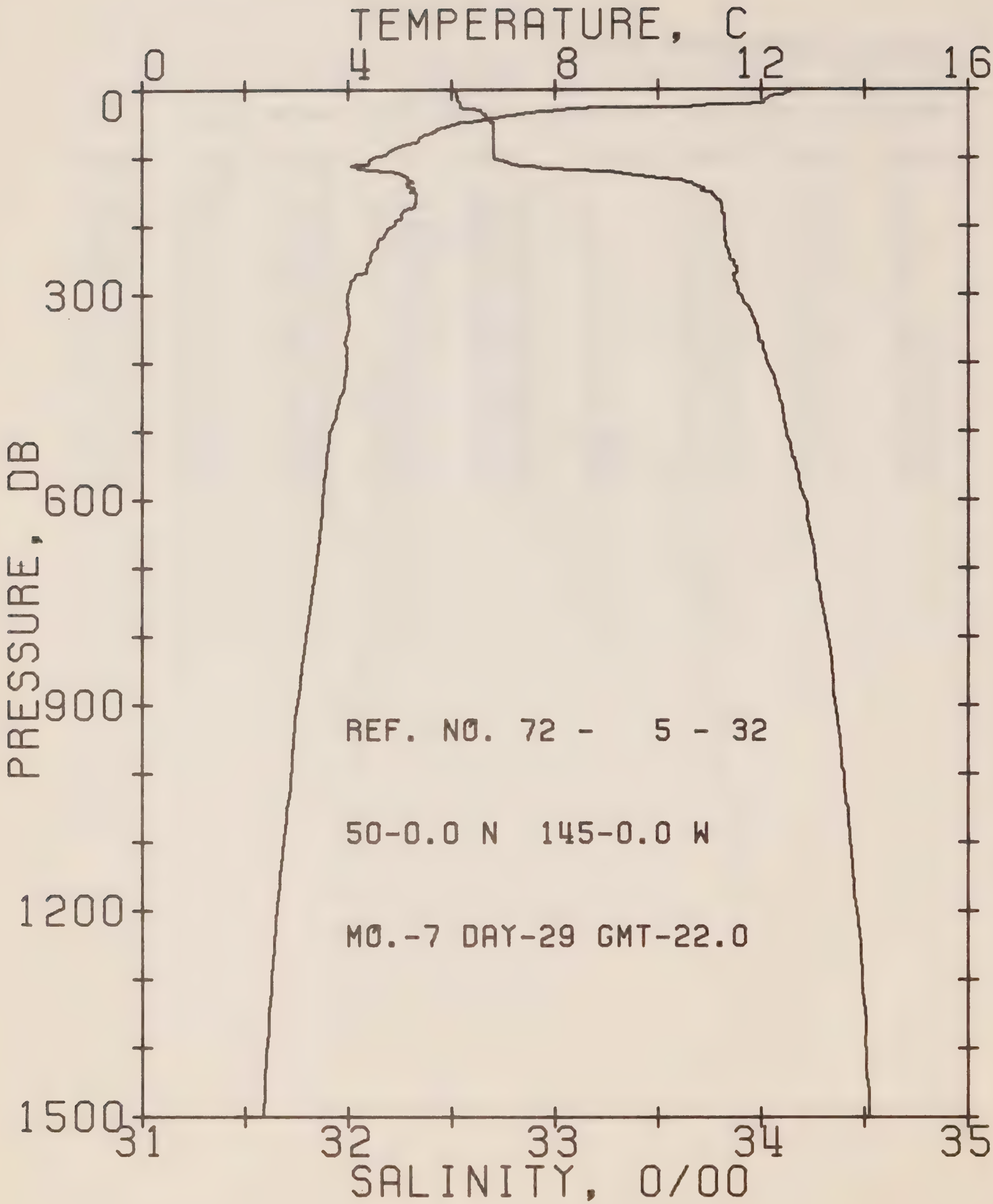
75
150
225
300
375
PRESSURE, DB
REF. NO. 72 - 5 - 30
50-0.0 N 145-0.0 W
MO.-7 DAY-28 GMT-18.0
31
32
33
34
35
SALINITY, 0/00

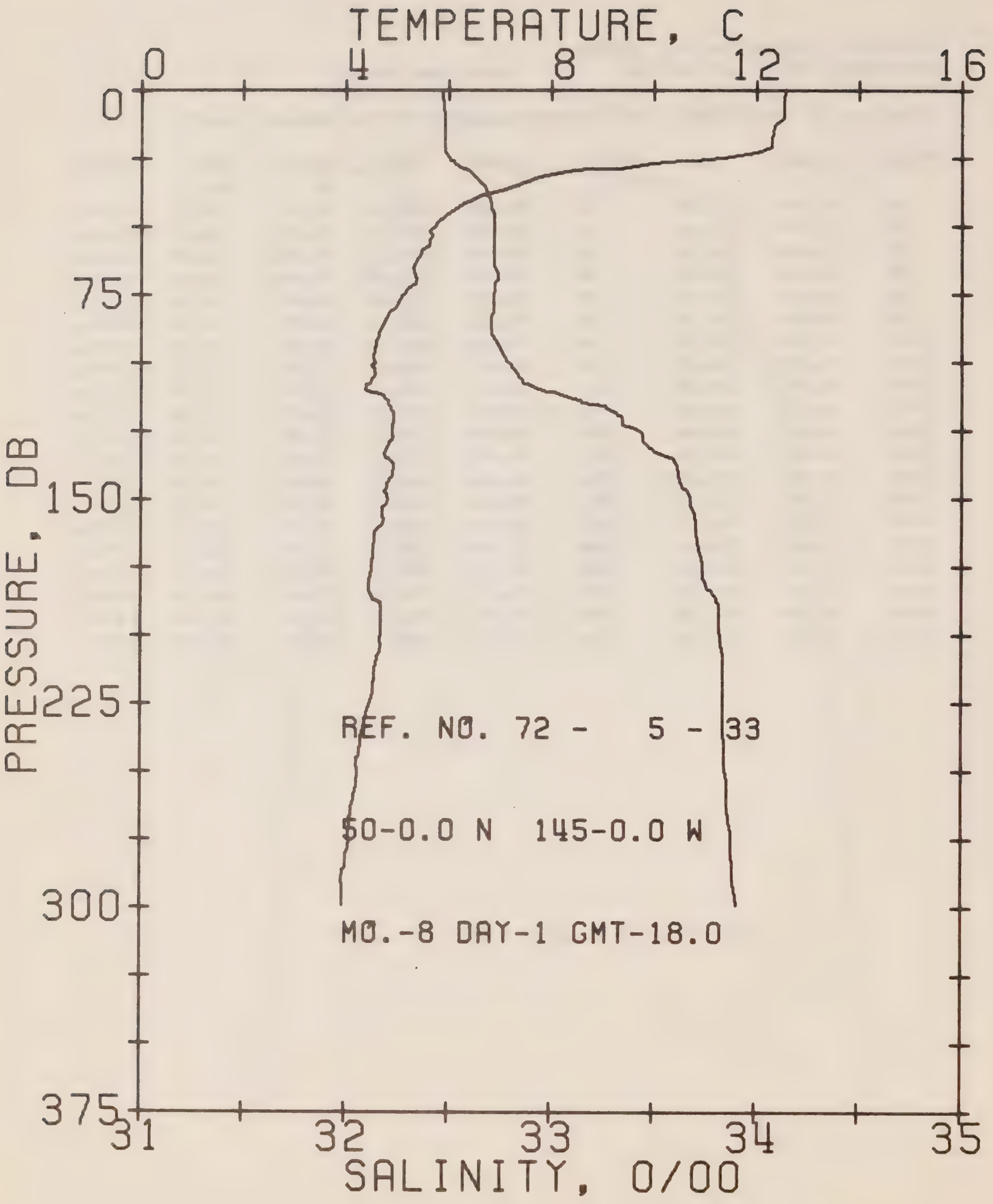
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 30 DATE 28/ 7/72
POSITION 50- 0.0N. 145- 0.0W GMT 18.0
RESULTS OF STP CAST 158 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	12.16	32.53	0	24.67	328.5	0.0	0.0	1495.
10	12.13	32.53	10	24.68	328.0	0.33	0.02	1495.
20	12.06	32.54	20	24.69	326.6	0.66	0.07	1495.
30	10.54	32.55	30	24.97	300.0	0.98	0.15	1490.
50	6.38	32.68	50	25.70	231.0	1.49	0.36	1474.
75	5.46	32.70	75	25.82	219.2	2.05	0.71	1471.
100	5.00	32.68	99	25.86	215.7	2.59	1.20	1470.
125	4.93	33.04	124	26.15	188.5	3.11	1.79	1470.
150	4.97	33.62	149	26.61	145.4	3.51	2.35	1471.
175	4.57	33.73	174	26.74	132.8	3.86	2.92	1470.
200	4.47	33.79	199	26.80	128.0	4.18	3.54	1470.
225	4.23	33.80	223	26.83	124.6	4.50	4.23	1470.
250	4.29	33.85	248	26.87	121.8	4.81	4.97	1471.


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 5 - 32
50-0.0 N 145-0.0 W
MO.-7 DAY-29 GMT-22.0
31
32
33
34
35
SALINITY, 0/00

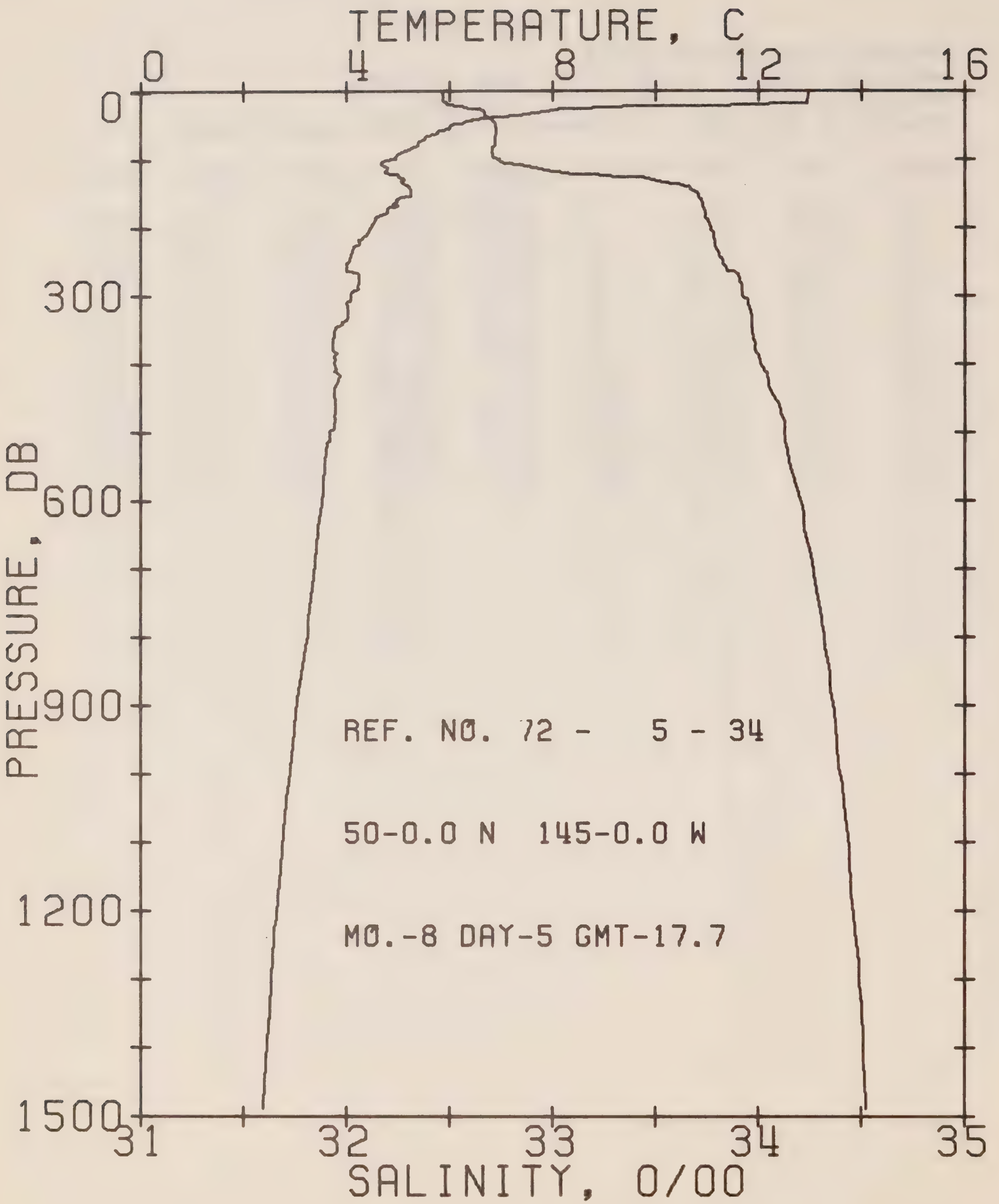
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 32   DATE 29/ 7/72
POSITION 50- 0.0N. 145- 0.0W   GMT 22.0
RESULTS OF STP CAST   235 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	12.55	32.51	0	24.58	337.0	0.0	0.0	1496.
10	12.17	32.52	10	24.66	329.8	0.34	0.02	1495.
20	12.03	32.54	20	24.70	326.1	0.66	0.07	1495.
30	8.18	32.64	30	25.42	257.4	0.96	0.14	1481.
50	6.13	32.70	50	25.75	226.6	1.44	0.34	1473.
75	5.36	32.70	75	25.84	217.9	1.99	0.69	1471.
100	4.53	32.70	99	25.93	208.9	2.53	1.16	1468.
125	5.05	33.37	124	26.41	164.4	3.00	1.71	1471.
150	5.21	33.74	149	26.68	139.1	3.37	2.23	1473.
175	5.15	33.81	174	26.74	133.4	3.71	2.79	1473.
200	4.85	33.82	199	26.78	129.6	4.04	3.42	1472.
225	4.56	33.83	223	26.82	126.0	4.36	4.11	1471.
250	4.42	33.86	248	26.86	122.5	4.67	4.86	1471.
300	3.98	33.89	298	26.93	115.8	5.27	6.53	1470.
400	3.97	34.03	397	27.04	106.4	6.37	10.46	1472.
500	3.65	34.12	496	27.14	97.1	7.38	15.10	1472.
600	3.50	34.21	595	27.23	89.3	8.32	20.31	1473.
800	3.18	34.32	793	27.35	79.3	10.01	32.33	1476.
1000	2.89	34.40	990	27.44	71.6	11.51	46.09	1478.
1200	2.61	34.46	1188	27.52	65.0	12.88	61.40	1480.


TEMPERATURE, C
0
4
8
12
16
0
75
150
225
300
375
PRESSURE, DB
REF. NO. 72 - 5 - 33
50-0.0 N 145-0.0 W
MO.-8 DAY-1 GMT-18.0
31
32
33
34
35
SALINITY, 0/00

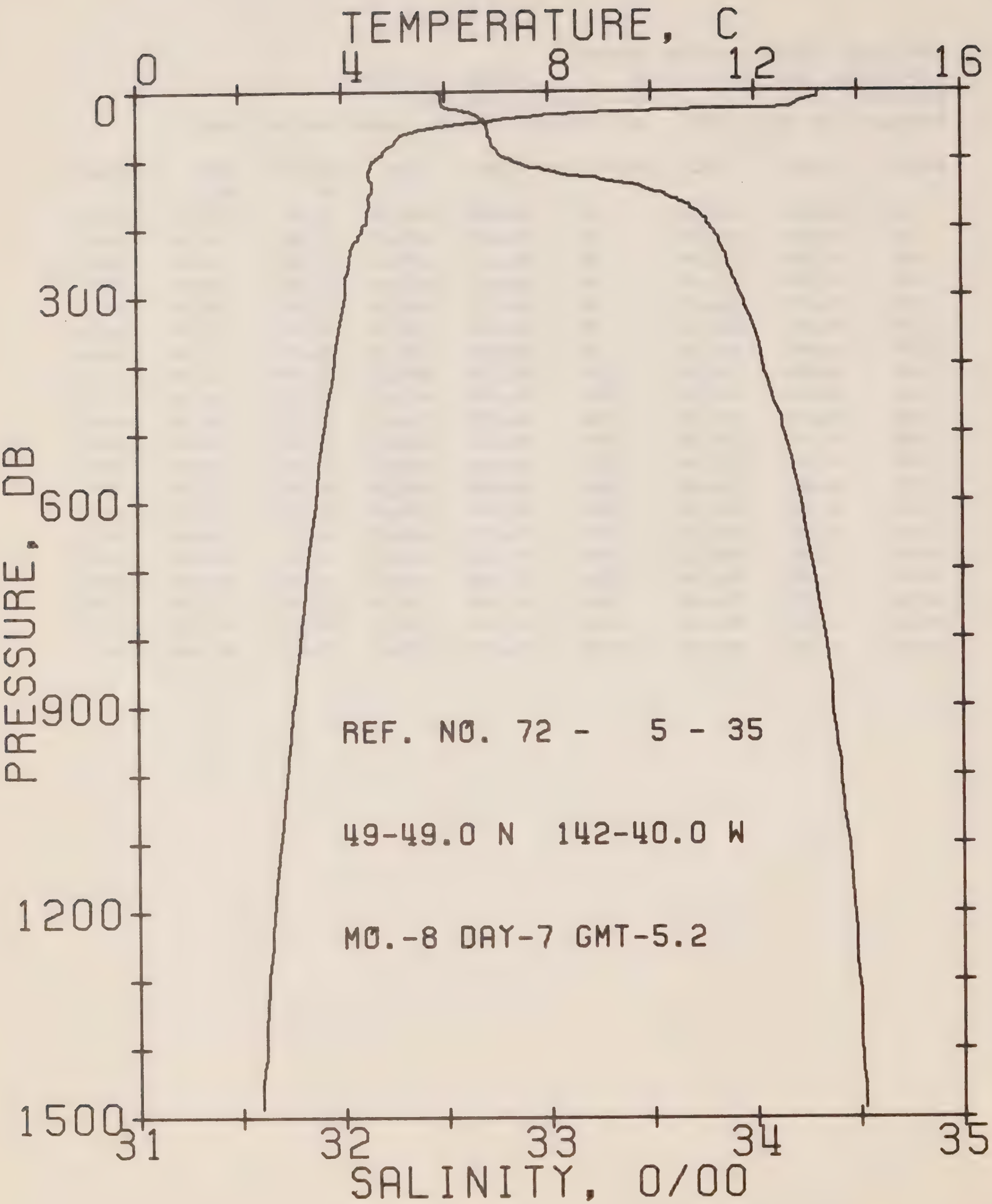
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 33 DATE 1/ 8/72
POSITION 50- 0.0N, 145- 0.0W GMT 18.0
RESULTS OF STP CAST 145 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	12.55	32.47	0	24.55	339.9	0.0	0.0	1496.
10	12.53	32.48	10	24.56	339.3	0.34	0.02	1496.
20	12.29	32.48	20	24.60	335.2	0.68	0.07	1496.
30	8.30	32.60	30	25.37	262.1	0.99	0.15	1481.
50	5.74	32.72	50	25.81	220.4	1.45	0.34	1472.
75	5.11	32.72	75	25.89	213.4	2.00	0.68	1470.
100	4.58	32.79	99	26.00	203.1	2.52	1.15	1468.
125	4.92	33.43	124	26.47	158.8	2.98	1.67	1471.
150	4.83	33.68	149	26.67	139.4	3.35	2.19	1471.
175	4.51	33.74	174	26.76	131.7	3.68	2.74	1470.
200	4.67	33.82	199	26.81	127.4	4.01	3.36	1471.
225	4.47	33.84	223	26.84	124.3	4.32	4.04	1471.
250	4.23	33.85	248	26.87	121.2	4.63	4.78	1470.


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 5 - 34
50-0.0 N 145-0.0 W
MO.-8 DAY-5 GMT-17.7
31
32
33
34
35
SALINITY, O/OO

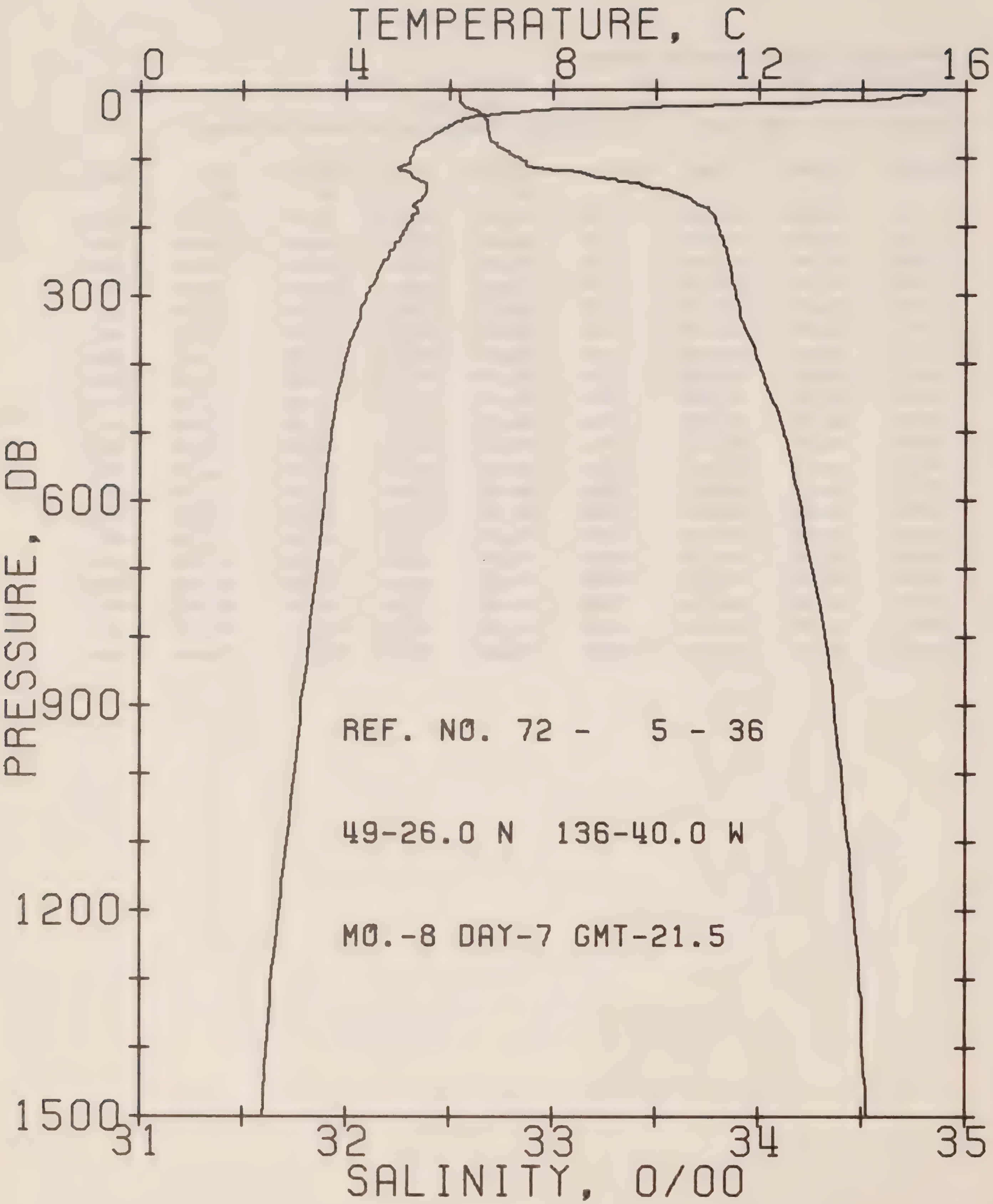
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 34   DATE 5/ 8/72
POSITICN 50- 0.0N, 145- 0.0W   GMT 17.7
RESULTS OF STP CAST   209 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	13.00	32.46	0	24.45	349.0	0.0	0.0	1498.
10	12.96	32.47	10	24.47	347.9	0.35	0.02	1498.
20	11.99	32.49	20	24.67	329.0	0.69	0.07	1495.
30	7.94	32.66	30	25.47	252.6	0.97	0.14	1480.
50	6.07	32.72	50	25.77	224.4	1.44	0.33	1473.
75	5.40	32.72	75	25.85	216.9	1.99	0.68	1471.
100	4.97	32.72	99	25.90	212.0	2.53	1.16	1469.
125	4.99	33.34	124	26.39	166.4	3.02	1.72	1471.
150	5.24	33.70	149	26.64	142.5	3.39	2.24	1473.
175	4.78	33.74	174	26.73	134.6	3.74	2.82	1471.
200	4.46	33.76	199	26.78	129.6	4.07	3.45	1470.
225	4.24	33.79	223	26.82	125.6	4.39	4.14	1470.
250	4.03	33.83	248	26.88	120.8	4.70	4.88	1469.
300	4.08	33.92	298	26.94	114.8	5.28	6.53	1471.
400	3.77	34.01	397	27.05	105.6	6.37	10.41	1471.
500	3.68	34.13	496	27.15	96.5	7.38	15.04	1472.
600	3.52	34.20	595	27.23	90.1	8.32	20.29	1474.
800	3.23	34.32	793	27.35	79.8	10.02	32.35	1476.
1000	2.89	34.40	990	27.44	71.7	11.53	46.15	1478.
1200	2.64	34.46	1188	27.51	65.6	12.89	61.45	1480.


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 5 - 35
49-49.0 N 142-40.0 W
MO.-8 DAY-7 GMT-5.2
31
32
33
34
35
SALINITY, 0/00

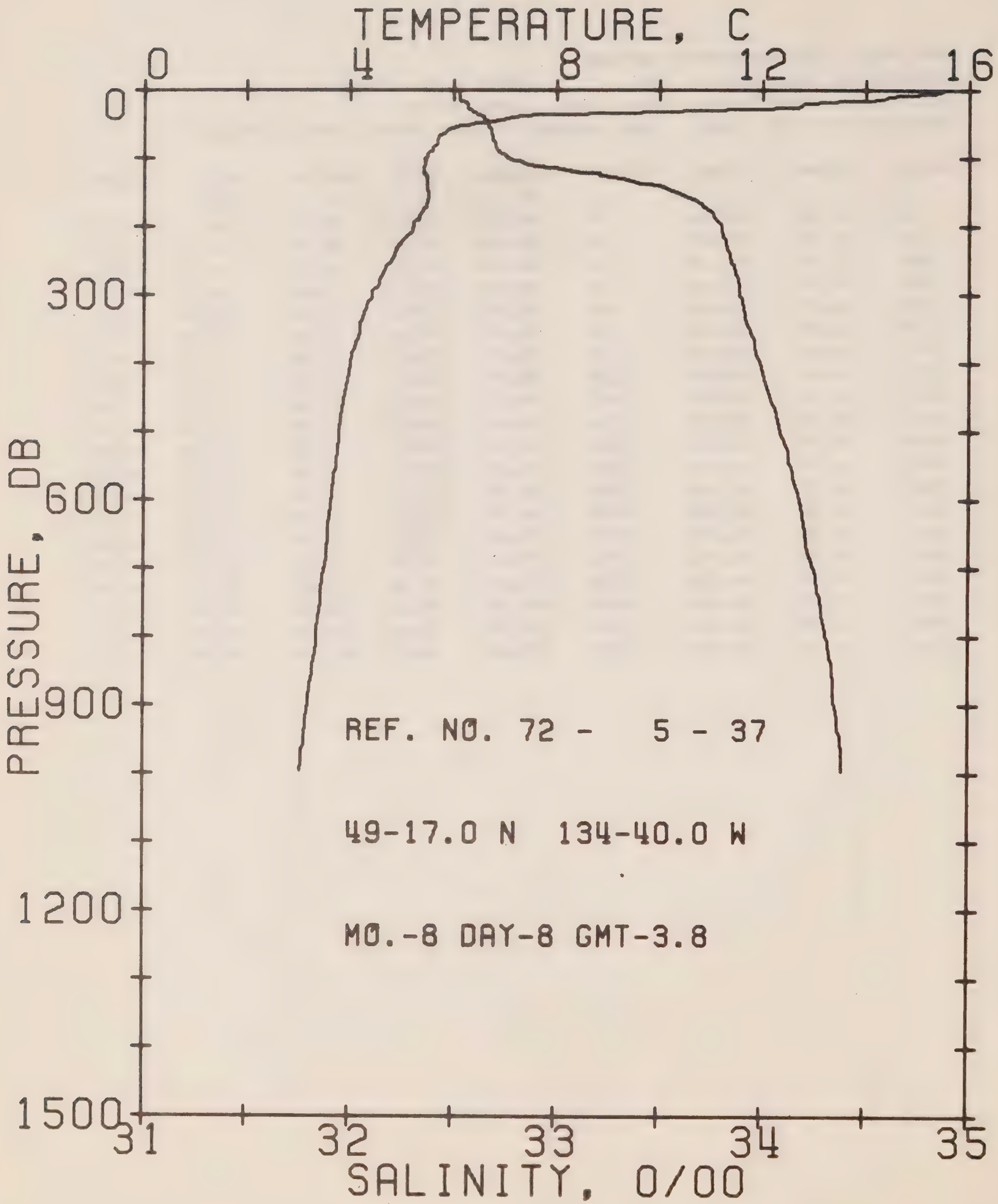
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 35 DATE 7/ 8/72
POSITICN 49-49.0N, 142-40.0W GMT 5.2
RESULTS OF STP CAST 178 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	13.26	32.47	0	24.41	353.1	0.0	0.0	1499.
10	13.23	32.48	10	24.42	352.3	0.35	0.02	1499.
20	12.80	32.49	20	24.51	343.7	0.70	0.07	1497.
30	9.74	32.60	30	25.15	283.5	1.02	0.15	1487.
50	6.11	32.70	50	25.75	226.3	1.51	0.35	1473.
75	5.01	32.72	75	25.89	212.6	2.06	0.70	1469.
100	4.65	32.82	99	26.01	201.5	2.58	1.16	1468.
125	4.53	33.15	124	26.29	175.3	3.06	1.71	1469.
150	4.55	33.55	149	26.61	145.8	3.45	2.26	1470.
175	4.47	33.71	174	26.74	133.2	3.80	2.84	1470.
200	4.39	33.78	199	26.80	127.3	4.13	3.46	1470.
225	4.20	33.83	223	26.86	122.0	4.44	4.13	1470.
250	4.12	33.87	248	26.90	118.8	4.74	4.86	1470.
300	4.04	33.93	298	26.96	113.5	5.32	6.49	1470.
400	3.84	34.03	397	27.06	104.5	6.40	10.34	1471.
500	3.60	34.14	496	27.16	95.3	7.40	14.91	1472.
600	3.46	34.22	595	27.24	88.5	8.32	20.04	1473.
800	3.16	34.34	793	27.37	77.8	9.98	31.85	1475.
1000	2.90	34.41	990	27.45	70.8	11.46	45.43	1478.
1200	2.62	34.47	1188	27.52	64.2	12.81	60.54	1480.


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 5 - 36
49-26.0 N 136-40.0 W
MO.-8 DAY-7 GMT-21.5
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 36 DATE 7/ 8/72
POSITION 49-26.0N. 136-40.0W GMT 21.5
RESULTS OF STP CAST 200 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	15.17	32.54	0	24.06	385.8	0.0	0.0	1505.
10	14.78	32.55	10	24.16	377.6	0.38	0.02	1504.
20	12.93	32.56	20	24.54	341.0	0.75	0.07	1498.
30	7.95	32.62	30	25.44	255.7	1.04	0.15	1480.
50	6.05	32.68	50	25.74	227.2	1.51	0.34	1473.
75	5.50	32.70	75	25.82	219.5	2.07	0.70	1471.
100	5.22	32.84	99	25.97	206.1	2.60	1.17	1471.
125	5.27	33.19	124	26.24	180.7	3.10	1.73	1472.
150	5.53	33.58	149	26.52	154.5	3.52	2.32	1474.
175	5.40	33.75	174	26.66	140.8	3.88	2.92	1474.
200	5.14	33.80	199	26.73	134.4	4.22	3.58	1473.
225	4.94	33.83	223	26.78	130.2	4.56	4.30	1473.
250	4.71	33.85	248	26.82	126.3	4.88	5.07	1472.
300	4.38	33.89	298	26.89	120.2	5.49	6.80	1472.
400	3.95	34.00	397	27.02	108.3	6.64	10.88	1472.
500	3.72	34.12	496	27.14	97.7	7.67	15.59	1473.
600	3.58	34.20	595	27.21	91.2	8.61	20.87	1474.
800	3.29	34.32	793	27.34	80.2	10.33	33.06	1476.
1000	2.99	34.40	990	27.43	72.6	11.85	47.03	1478.
1200	2.71	34.46	1188	27.51	66.1	13.24	62.56	1480.


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 5 - 37
49-17.0 N 134-40.0 W
MO.-8 DAY-8 GMT-3.8
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 37 DATE 8/ 8/72
POSITICN 49-17.0N, 134-40.0W GMT 3.8
RESULTS OF STP CAST 190 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	15.49	32.53	0	23.99	393.2	0.0	0.0	1506.
10	14.53	32.53	10	24.19	373.9	0.39	0.02	1503.
20	12.82	32.56	20	24.56	339.0	0.75	0.07	1498.
30	11.00	32.59	30	24.92	304.7	1.08	0.16	1491.
50	6.37	32.67	50	25.69	231.7	1.59	0.36	1474.
75	5.67	32.69	75	25.80	222.0	2.15	0.72	1472.
100	5.46	32.76	99	25.88	214.6	2.70	1.21	1472.
125	5.47	33.21	124	26.23	181.5	3.20	1.78	1473.
150	5.51	33.57	149	26.51	155.0	3.62	2.37	1474.
175	5.42	33.74	174	26.65	141.8	3.99	2.98	1474.
200	5.22	33.80	199	26.72	135.3	4.33	3.64	1474.
225	4.96	33.82	223	26.77	131.1	4.67	4.36	1473.
250	4.80	33.85	248	26.81	127.6	4.99	5.14	1473.
300	4.42	33.89	298	26.88	120.7	5.61	6.87	1472.
400	4.01	33.99	397	27.01	109.8	6.76	10.97	1472.
500	3.79	34.09	496	27.11	100.9	7.81	15.79	1473.
600	3.63	34.18	595	27.20	92.9	8.78	21.20	1474.
800	3.36	34.31	793	27.33	81.9	10.53	33.65	1476.

SURFACE TEMPERATURE AND SALINITY OBSERVATIONS

(P-72-5)

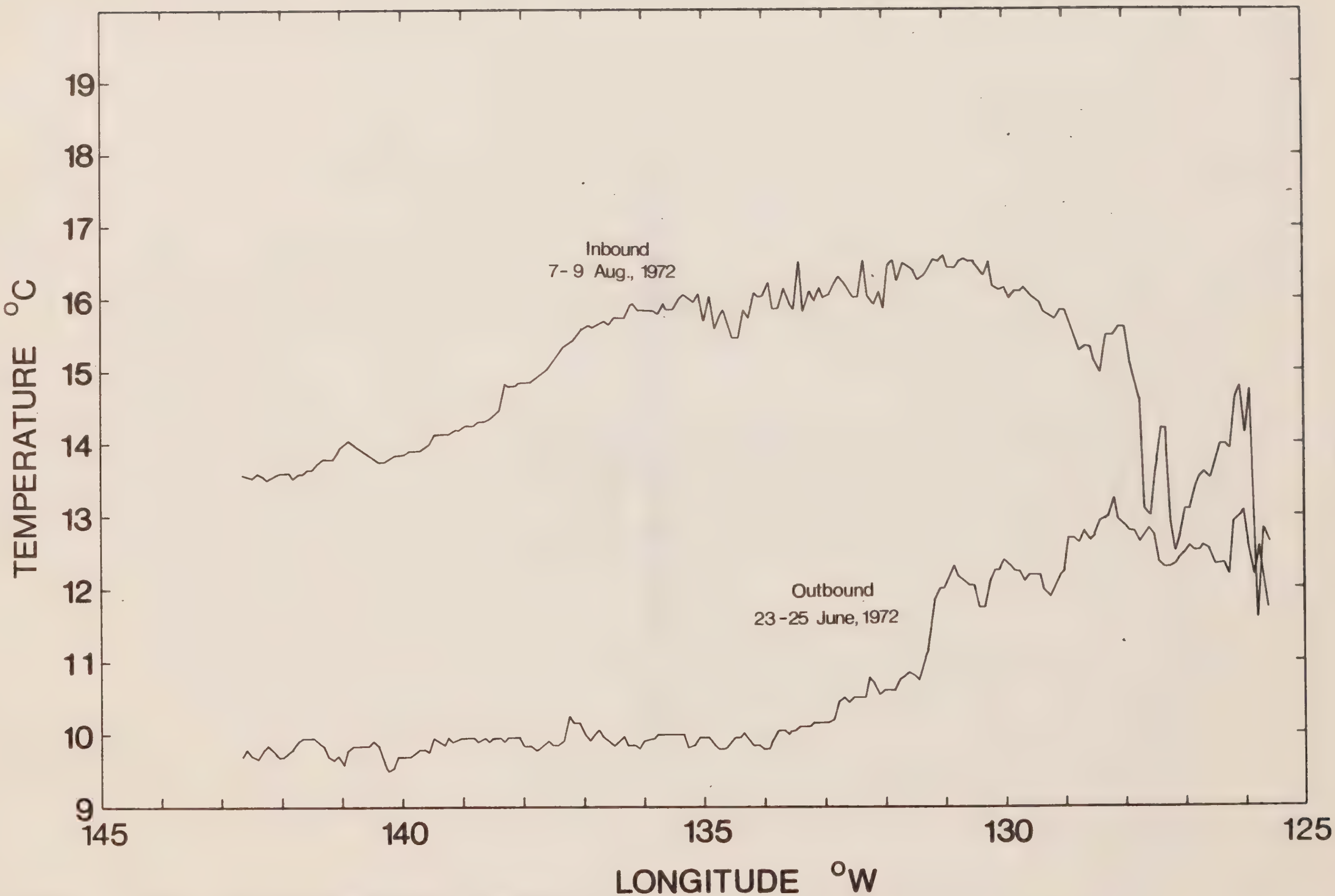


FIGURE 21 GRAPH OF LINE P SURFACE TEMPERATURES AS CONTINUOUSLY RECORDED FROM A PROBE LOCATED AT THE ENGINE ROOM INTAKE (APPROXIMATELY 3 METERS BELOW SURFACE) P-72-5.

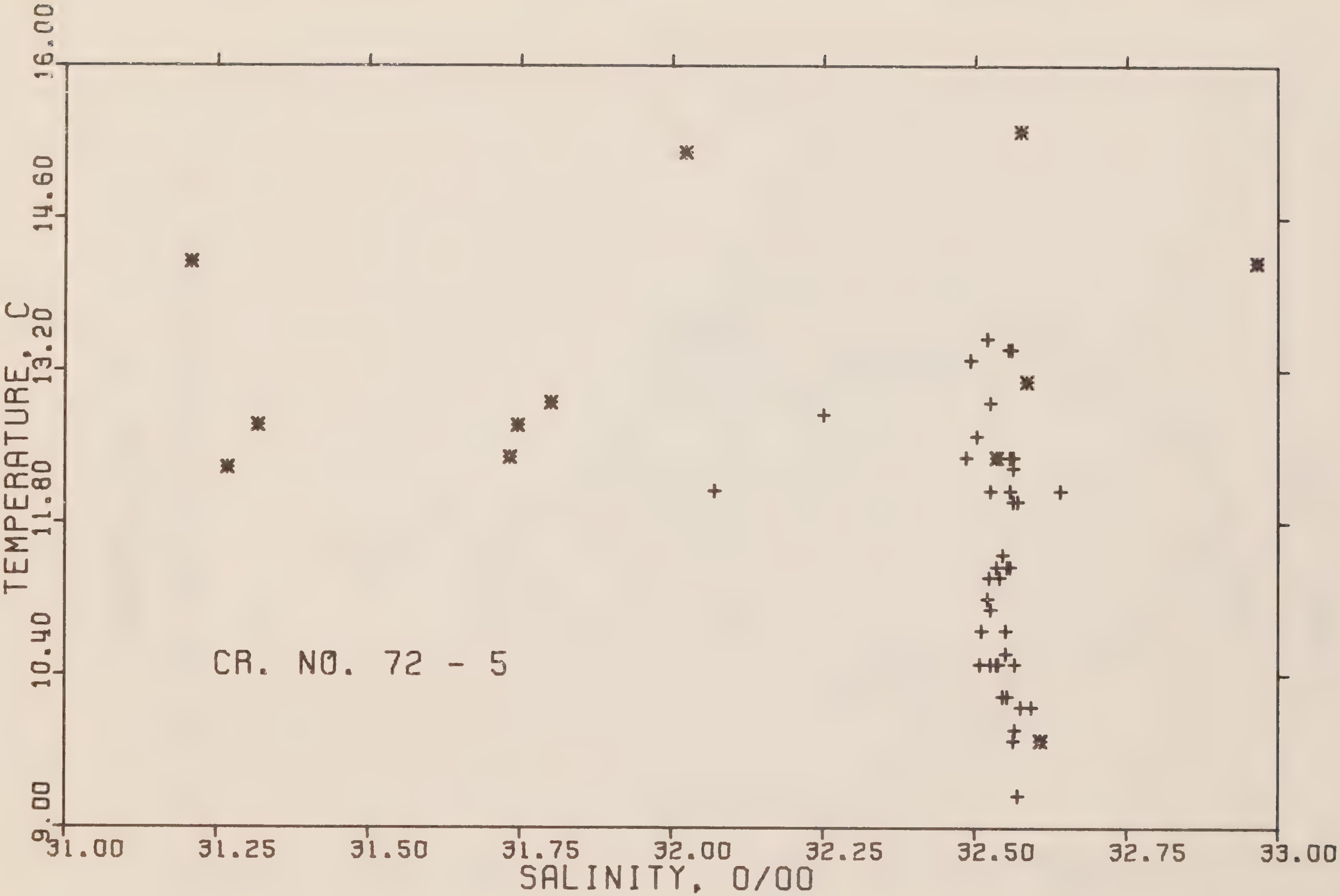


Figure 22 T-S plot of surface temperature and salinity observations on Line P (asterisks) and at station P (pluses) during cruise P-72-5.

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS
CRUISE REFERENCE NUMBER 72- 5

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DY	GMT	0/00	C	WEST
72	6	23	2340	0.0	12.6	125-32
72	6	24	145	31.318	12.7	126- 0
72	6	24	400	31.268	12.3	126-40
72	6	24	845	31.732	12.4	127-40
72	6	24	1320	0.0	12.6	128-40
72	6	24	1948	0.0	11.9	130-40
72	6	25	145	0.0	10.4	132-40
72	6	25	820	32.608	9.8	134-40
72	6	25	1445	0.0	9.8	136-40
72	6	25	2025	32.607	9.8	138-40
72	6	26	250	0.0	9.8	140-40
72	6	26	818	0.0	9.5	142-40
72	6	27	0	32.571	9.3	145- 0
72	6	28	0	32.575	10.1	ON STATION
72	6	29	0	32.592	10.1	ON STATION
72	6	30	0	32.563	9.8	ON STATION
72	7	1	0	32.565	9.9	ON STATION
72	7	2	0	32.552	10.2	ON STATION
72	7	3	0	32.544	10.2	ON STATION
72	7	4	0	32.507	10.5	ON STATION
72	7	5	0	32.565	10.5	ON STATION
72	7	6	0	32.524	10.5	ON STATION
72	7	7	0	32.537	10.5	ON STATION
72	7	8	0	32.550	10.6	ON STATION
72	7	9	0	32.557	11.4	ON STATION
72	7	10	0	32.521	11.1	ON STATION
72	7	11	0	32.509	10.8	ON STATION
72	7	12	0	32.536	11.4	ON STATION
72	7	13	0	32.523	11.3	ON STATION
72	7	14	0	32.525	11.0	ON STATION
72	7	15	0	32.535	10.5	ON STATION
72	7	16	0	32.550	10.8	ON STATION
72	7	17	0	32.541	11.3	ON STATION
72	7	18	0	32.544	11.5	ON STATION
72	7	19	0	32.558	12.4	ON STATION
72	7	20	0	32.562	12.0	ON STATION
72	7	21	0	32.557	12.1	ON STATION
72	7	22	0	32.560	13.4	ON STATION
72	7	23	0	32.540	12.4	ON STATION
72	7	24	0	32.556	13.4	ON STATION
72	7	25	0	32.562	12.4	ON STATION
72	7	26	0	32.562	12.3	ON STATION
72	7	27	0	32.563	12.4	ON STATION
72	7	28	0	32.570	12.0	ON STATION
72	7	29	0	32.552	11.4	ON STATION

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS
CRUISE REFERENCE NUMBER 72- 5

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DY	GMT	0/00	C	WEST
72	7	29	0	32.552	11.4	ON STATION
72	7	30	0	32.526	12.1	ON STATION
72	7	31	0	32.486	12.4	ON STATION
72	8	1	0	32.070	12.1	ON STATION
72	8	2	0	32.639	12.1	ON STATION
72	8	3	0	32.250	12.8	ON STATION
72	8	4	0	32.524	12.9	ON STATION
72	8	5	0	32.502	12.6	ON STATION
72	8	6	0	32.492	13.3	145- 0
72	8	7	0	32.456	0.0	143-30
72	8	7	515	32.519	13.5	142-40
72	8	7	1215	32.535	12.4	140-40
72	8	7	1640	32.586	13.1	138-40
72	8	7	2130	33.143	15.4	136-40
72	8	8	350	32.575	15.4	134-40
72	8	8	835	32.534	0.0	132-40
72	8	8	1350	32.022	15.2	130-40
72	8	8	2015	32.964	14.2	128-40
72	8	8	2330	0.0	13.5	127-40
72	8	9	230	31.801	12.9	126-40
72	8	9	437	31.207	14.2	126- 0
72	8	9	600	31.745	12.7	125-32

OCEANOGRAPHIC DATA OBTAINED ON CRUISE P-72-6

(C.O.D.C. REFERENCE NO. 15-72-006)

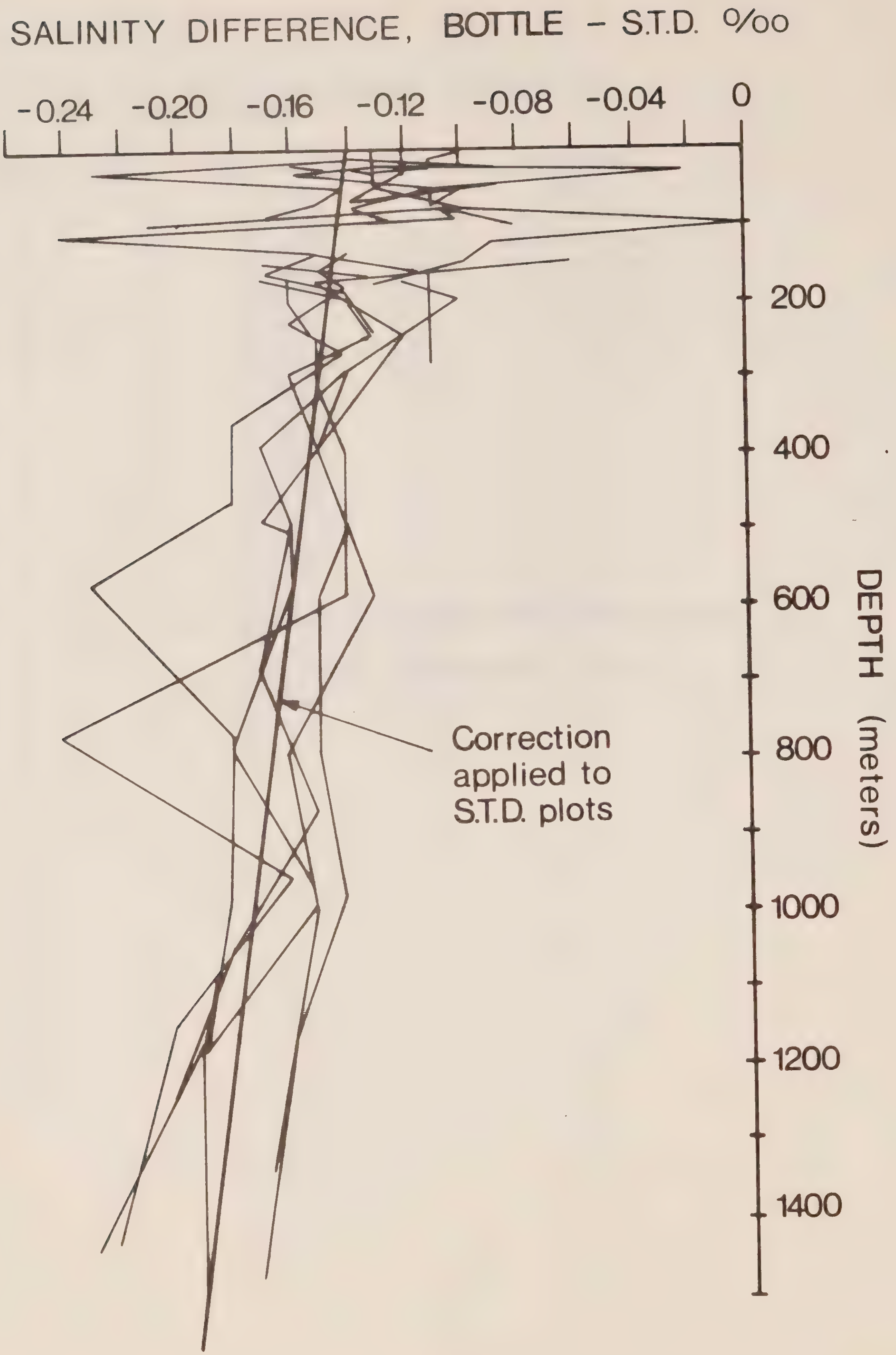


Figure 23 Bottle - STD salinity value difference profiles P-72-6.

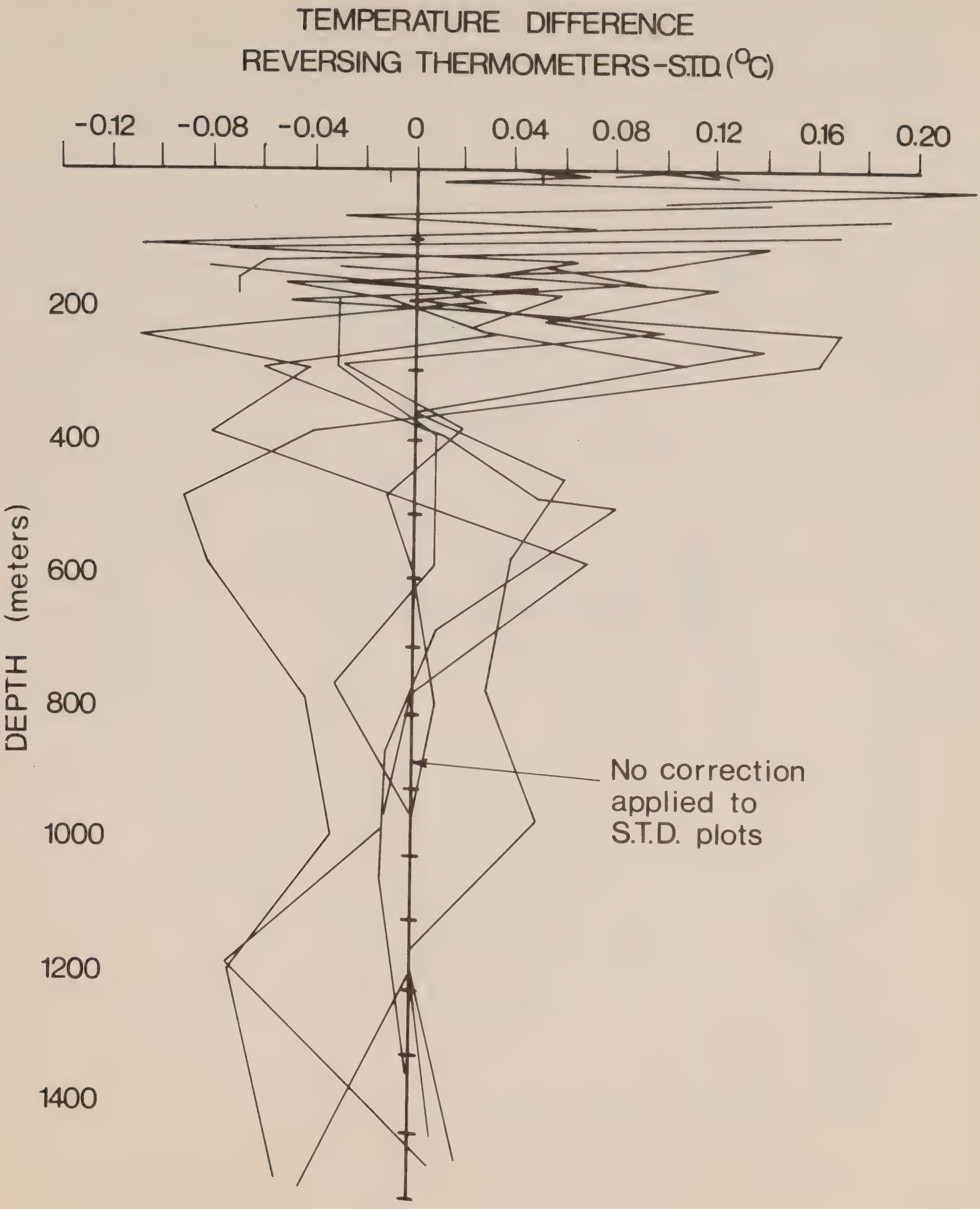


Figure 24 Reversing thermometer - STD temperature difference profiles P-72-6.

COMPOSITE PLOTS OF TEMPERATURE, SALINITY

AND DISSOLVED OXYGEN VS DEPTH

(P-72-6)

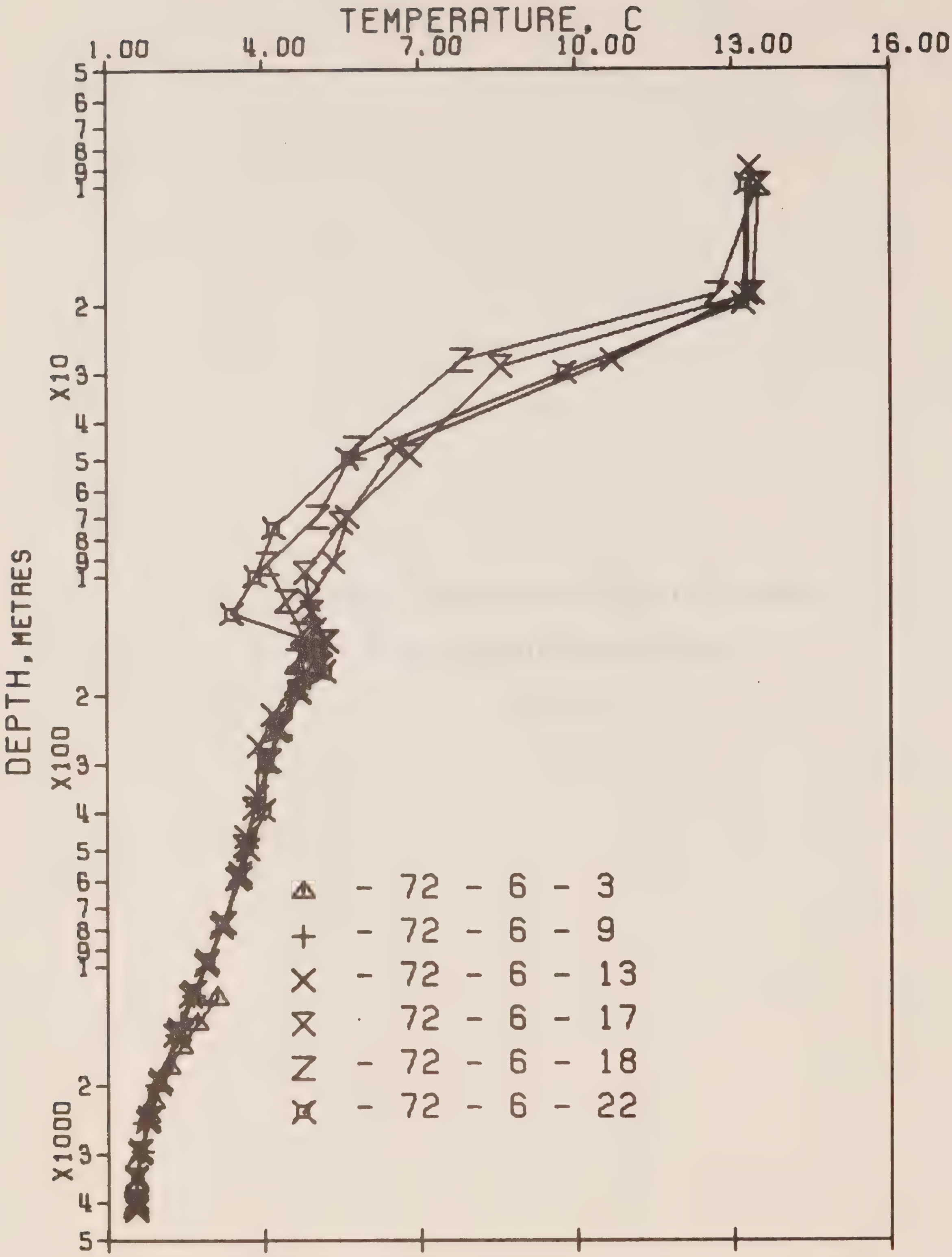


Figure 25 Composite plot of temperature vs $\log_{10}$ depth P-72-6.

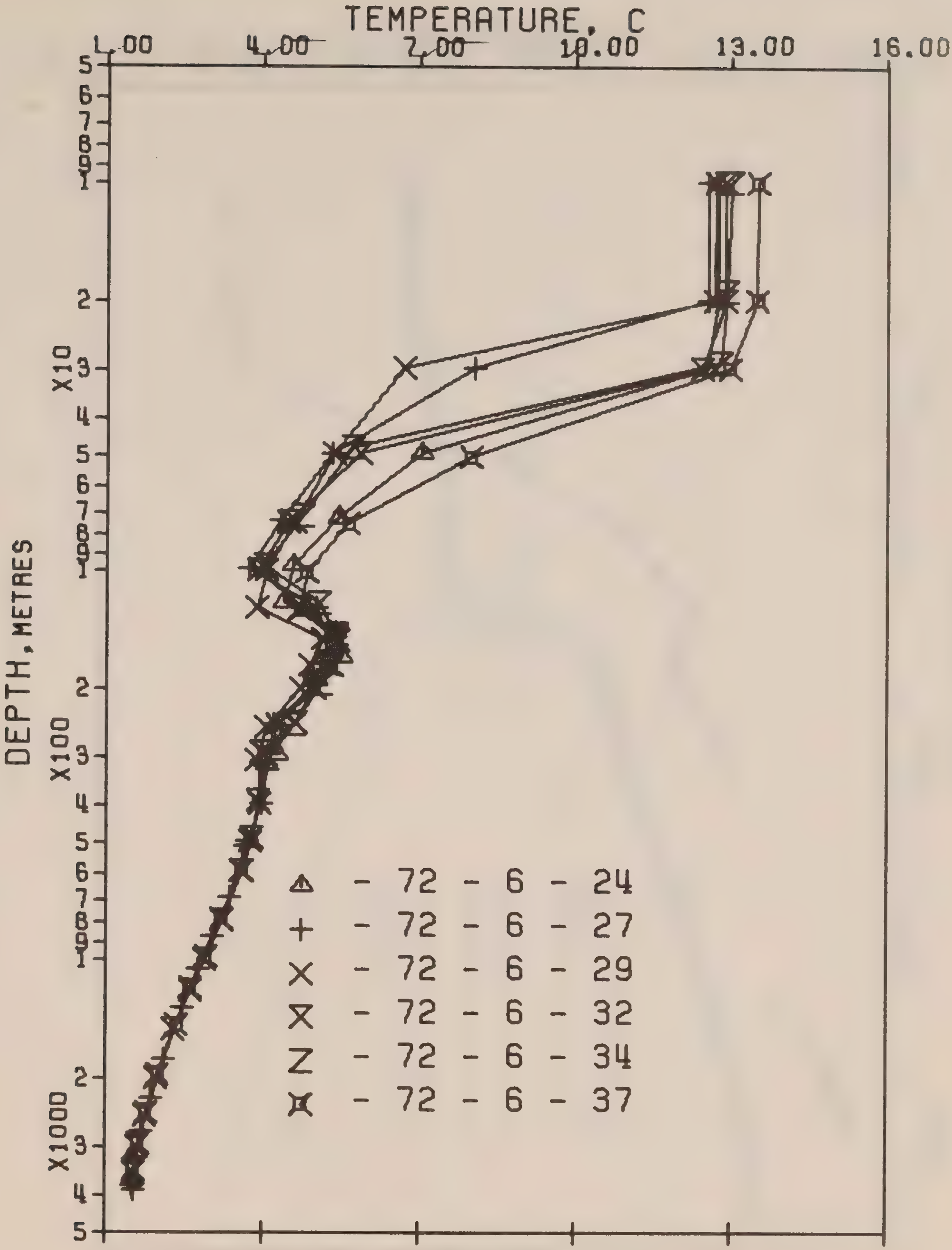


Figure 26 Composite plot of temperature vs $\log_{10}$ depth P-72-6.

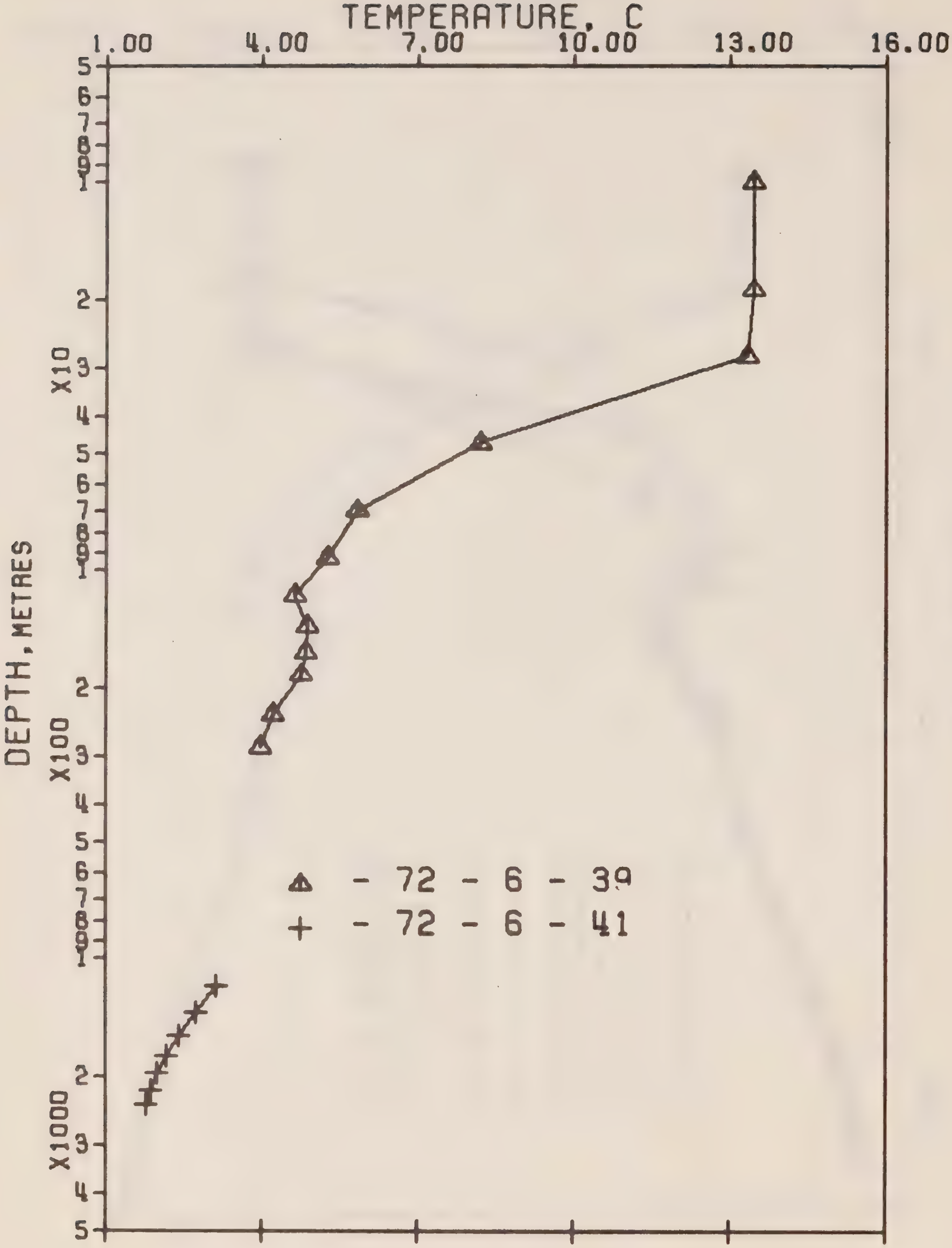


Figure 27 Composite plot of temperature vs $\log_{10}$ depth P-72-6.

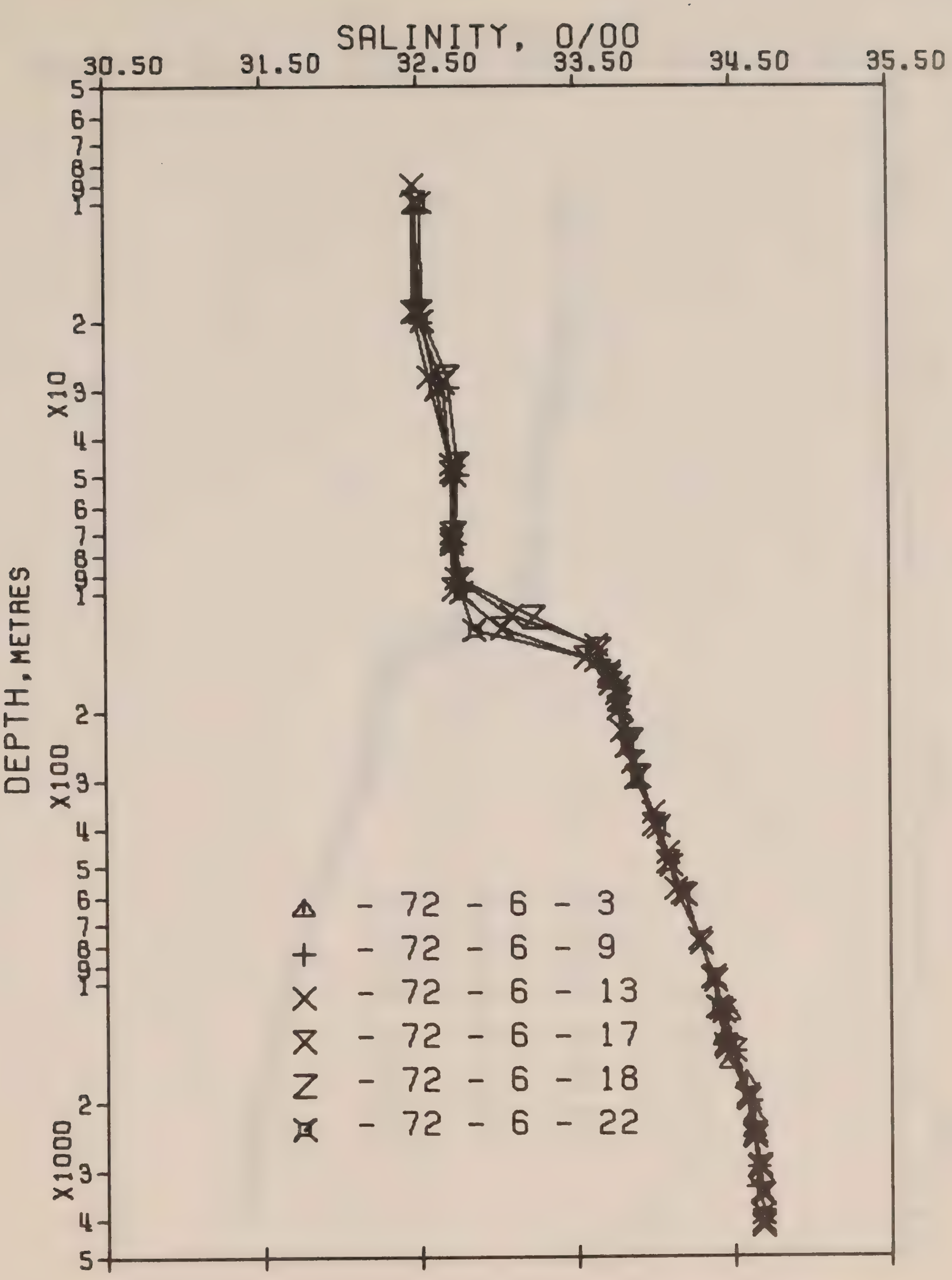


Figure 28 Composite plot of salinity vs $\log_{10}$ depth P-72-6.

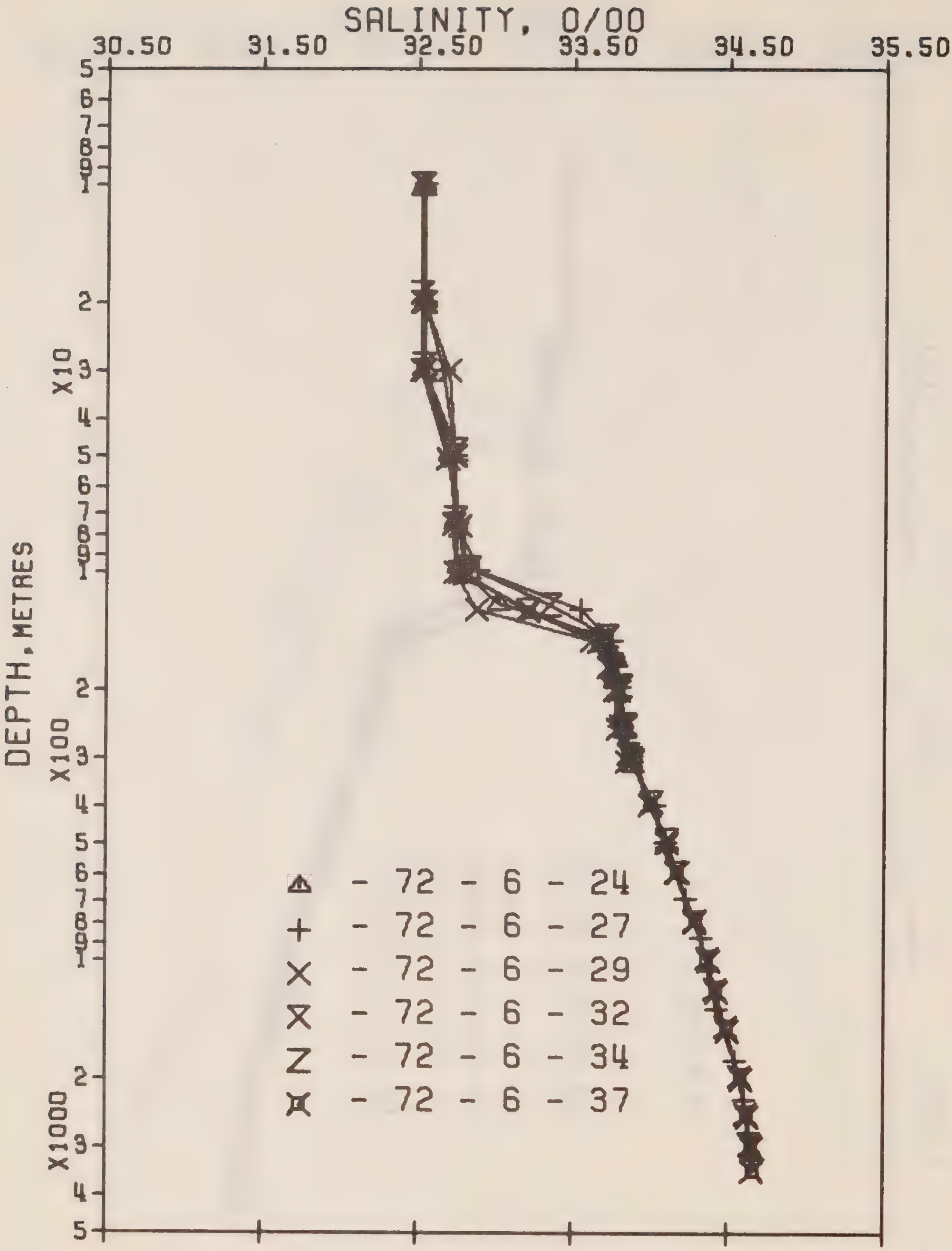


Figure 29 Composite plot of salinity vs $\log_{10}$ depth P-72-6.

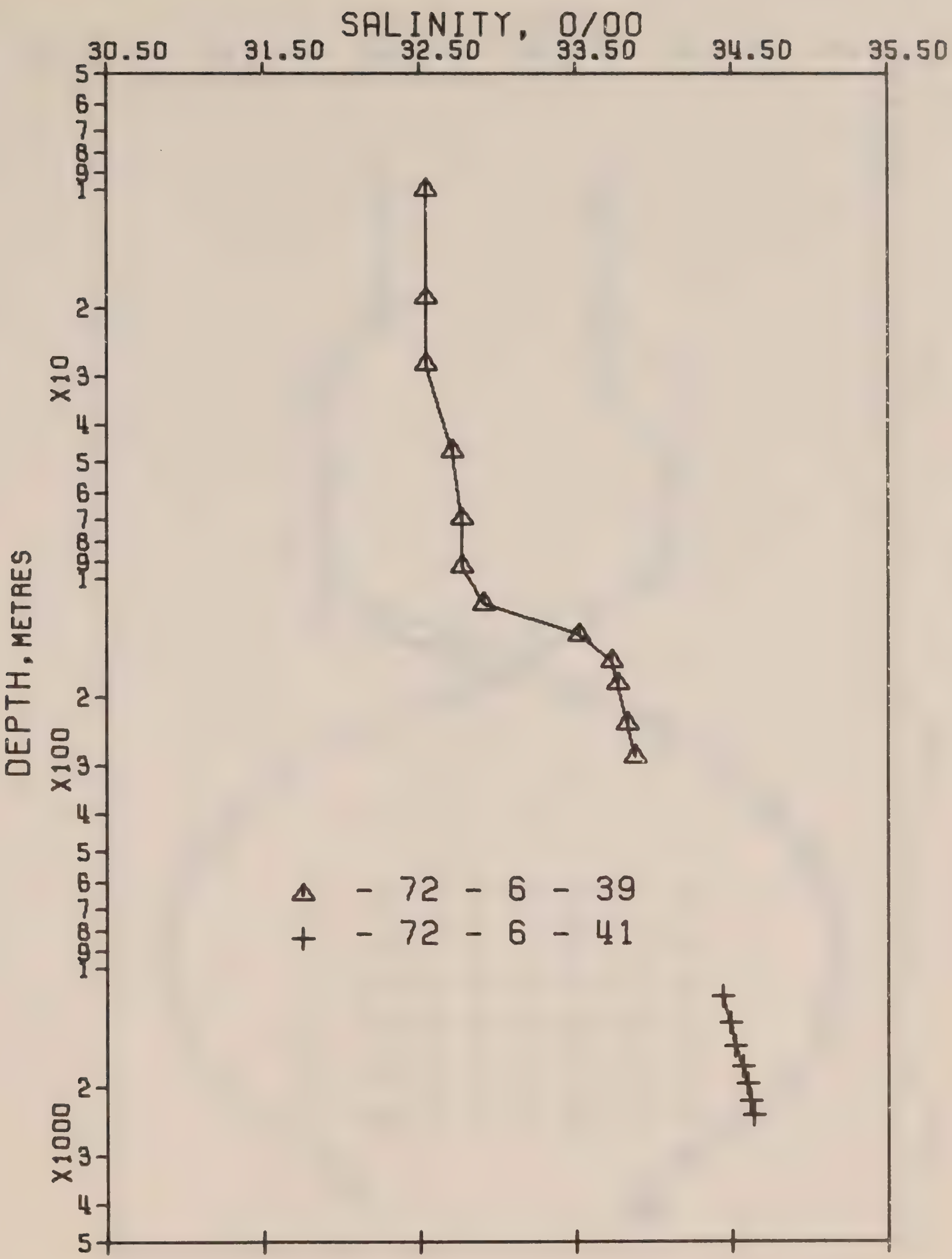


Figure 30 Composite plot of salinity vs $\log_{10}$ depth P-72-6.

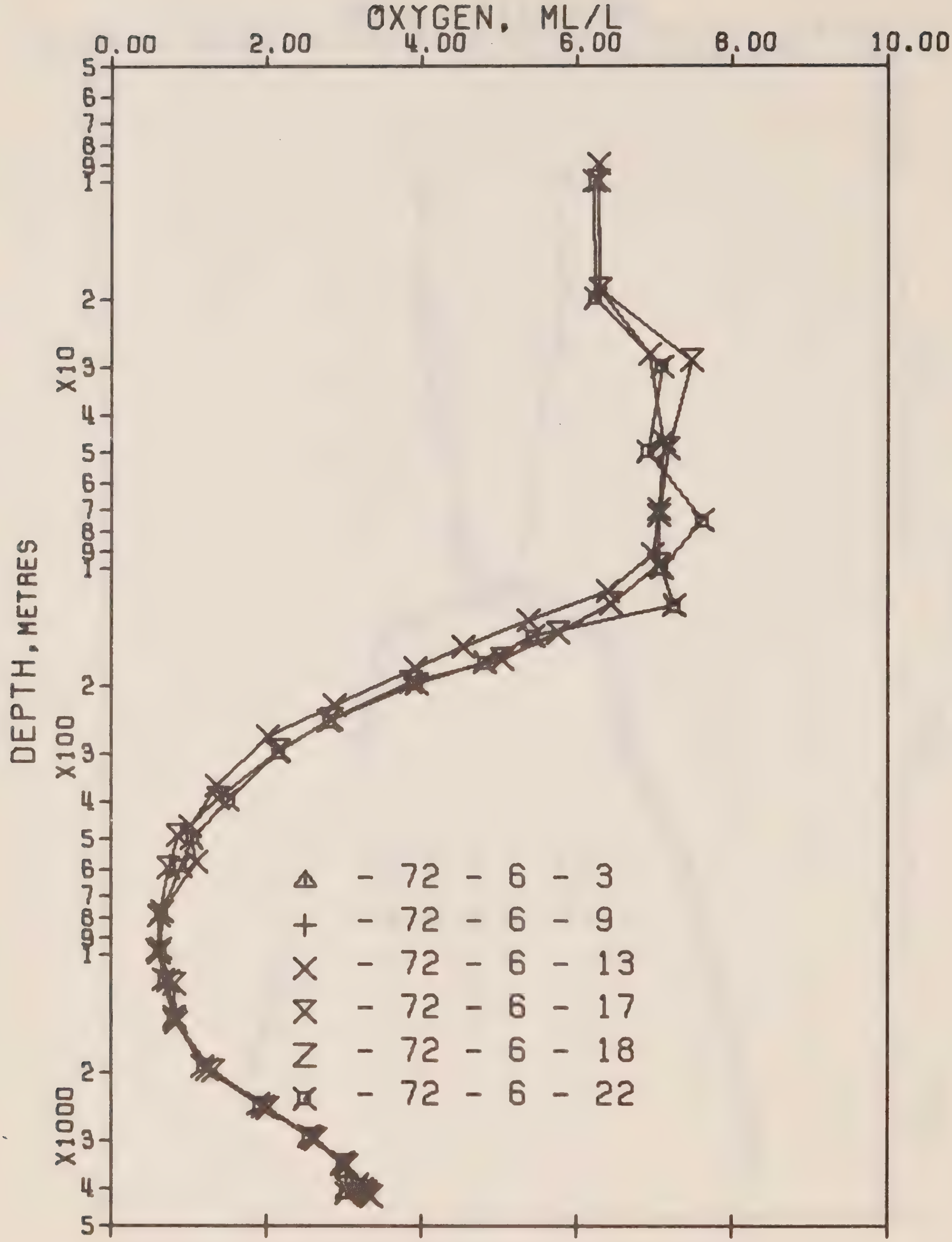


Figure 31 Composite plot of oxygen vs $\log_{10}$ depth P-72-6.

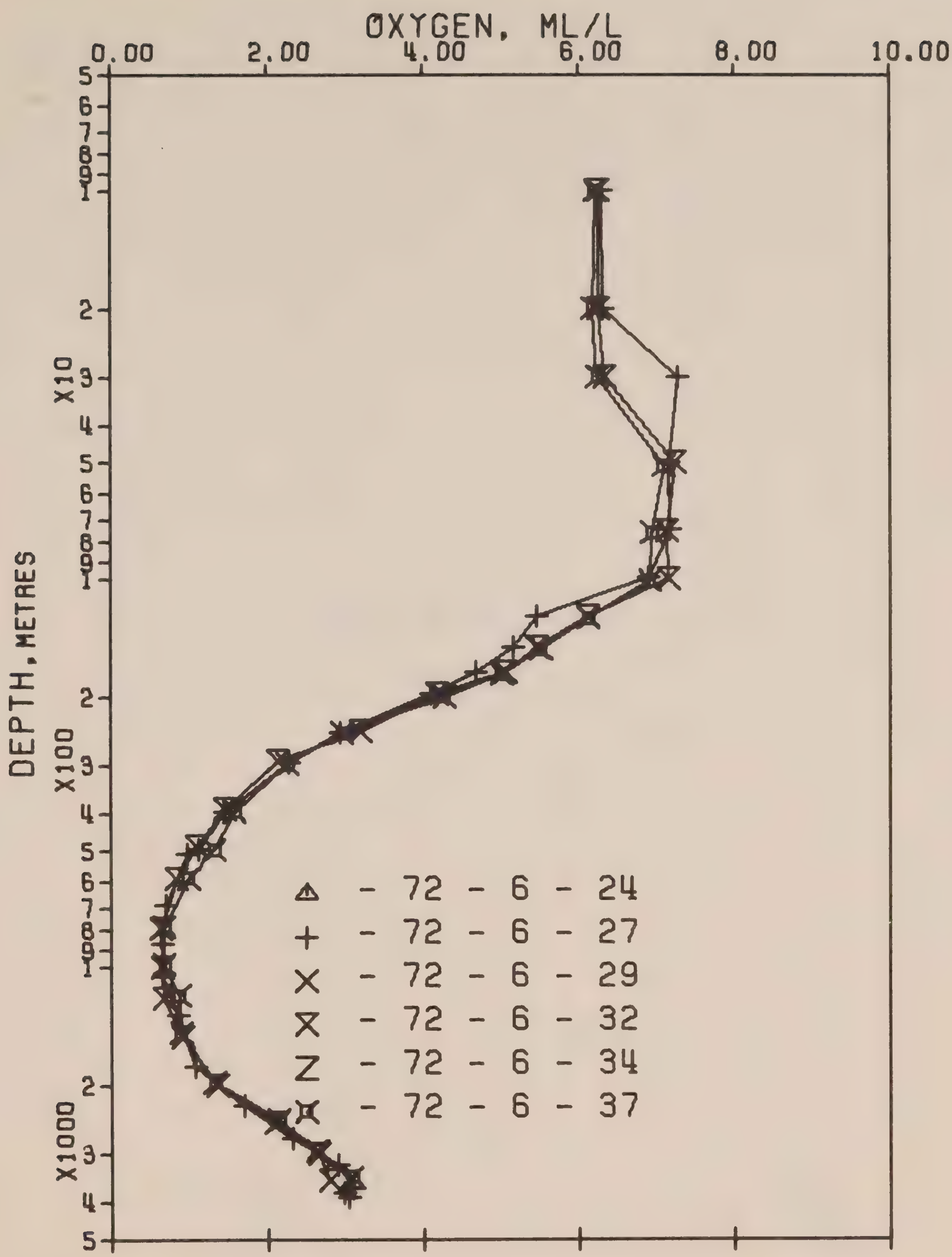
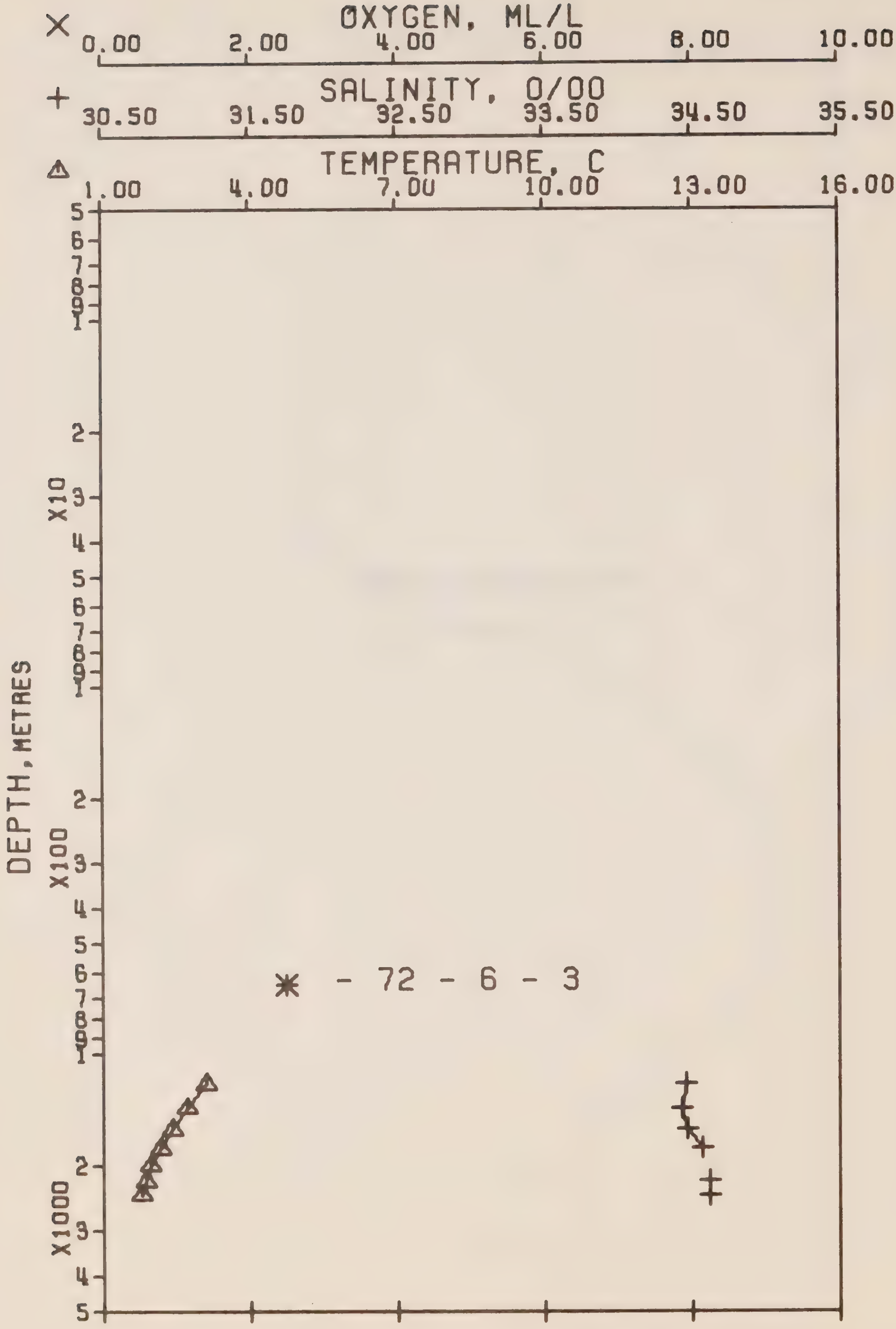


Figure 32 Composite plot of oxygen vs $\log_{10}$ depth P-72-6.

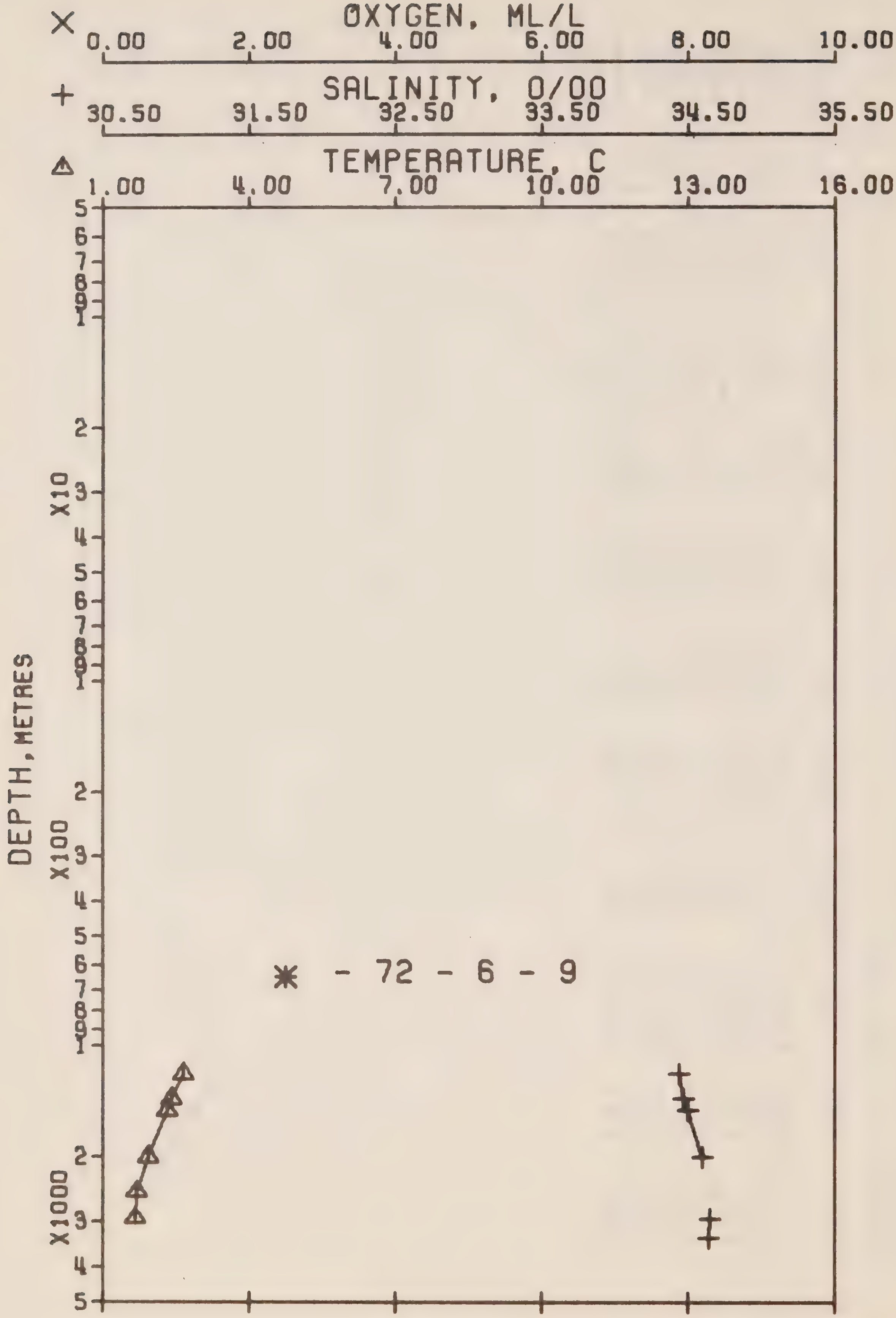
RESULTS OF BOTTLE CASTS

(P-72-6)


X OXYGEN, ML/L
0.00 2.00 4.00 6.00 8.00 10.00
+ SALINITY, 0/00
30.50 31.50 32.50 33.50 34.50 35.50
△ TEMPERATURE, C
1.00 4.00 7.00 10.00 13.00 16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 6 - 3

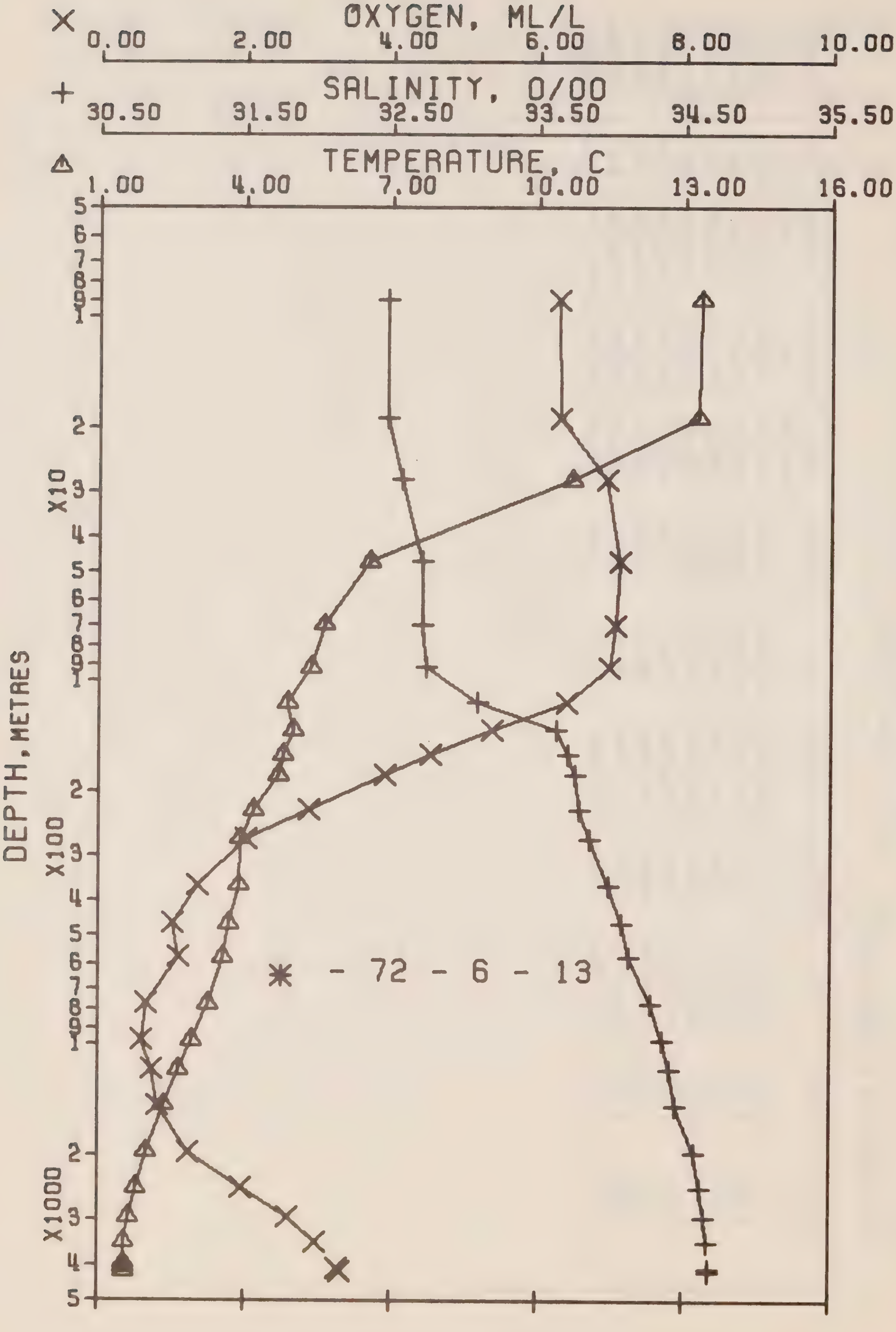
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 3 DATE 5/ 8/72
POSITION 48-46.0 N, 127-40.0 W GMT 18.2
HYDROGRAPHIC CAST CATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	14.64	31.904	0	23.689	421.8	14.64	421.6	0.0	0.0	0.0	1502.
1211	3.11	34.460	1200	27.469	70.8	3.02	61.5	26.97	53.53	0.0	1482.
1414	2.72	34.428	1401	27.478	69.9	2.62	60.5	28.39	72.80	0.0	1484.
1618	2.41	34.468	1602	27.537	64.4	2.30	54.9	29.77	94.14	0.0	1486.
1823	2.16	34.568	1804	27.637	55.1	2.03	45.4	30.99	115.61	0.0	1488.
2028	1.96	34.610*	2005	27.687	50.4	1.82	40.6	32.06	136.57	0.0	1491.
2233	1.86	34.619	2207	27.7C2	49.4	1.70	39.0	33.08	158.72	0.0	1494.
2438	1.79	34.618	2408	27.706	49.3	1.62	38.6	34.09	182.74	0.0	1497.


OXYGEN, ML/L
0.00 2.00 4.00 6.00 8.00 10.00
SALINITY, 0/00
30.50 31.50 32.50 33.50 34.50 35.50
TEMPERATURE, C
1.00 4.00 7.00 10.00 13.00 16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 6 - 9

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 9 DATE 6/ 8/72
POSITION 49-29.0 N, 137- 8.0 W GMT 17.7
HYDROGRAPHIC CAST CATA

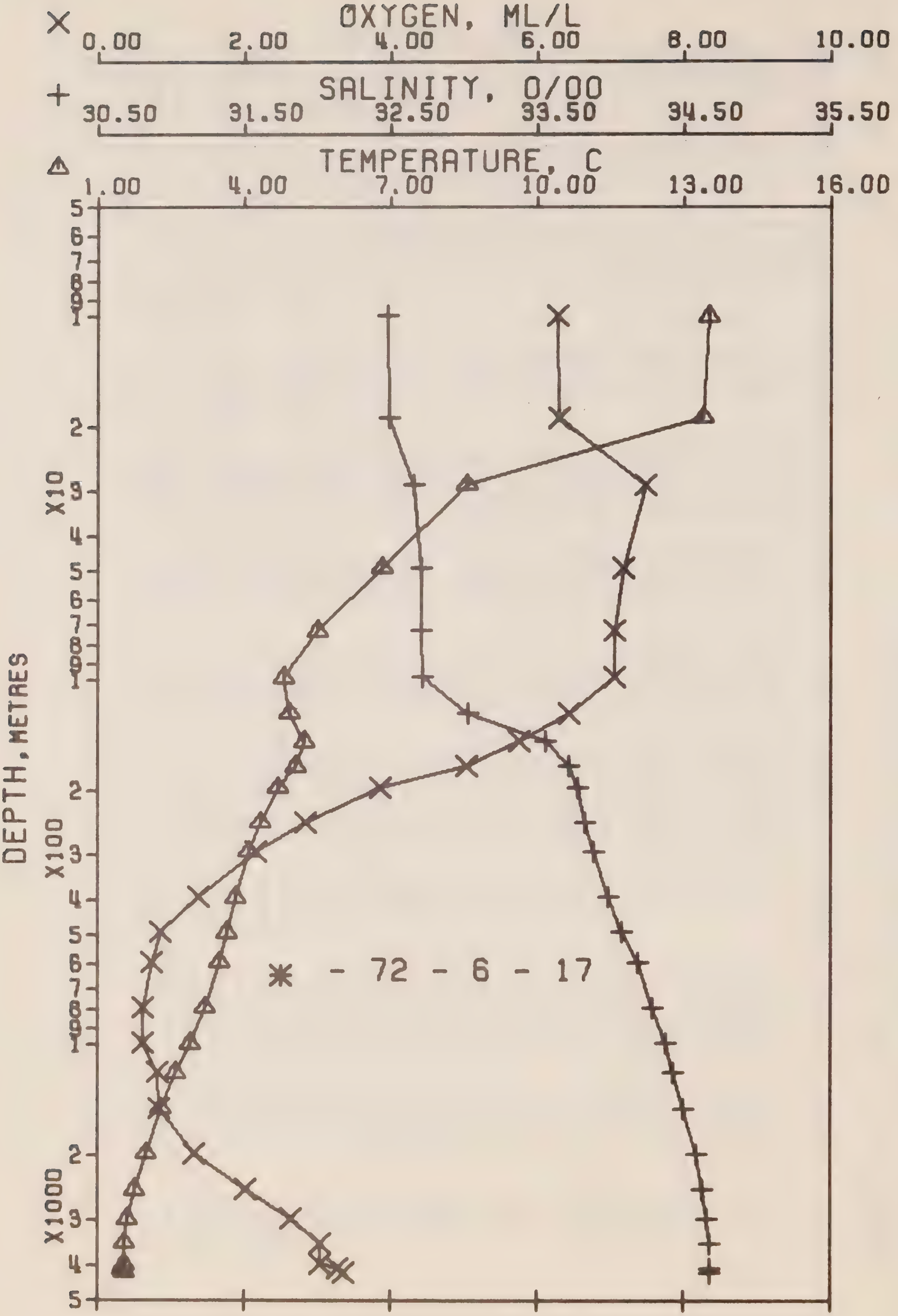
PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	14.66	32.548	0	24.180	375.0	14.66	374.8	0.0	0.0	0.0	1503.
1200	2.66	34.442	1189	27.495	67.0	2.58	59.2	24.20	51.67	0.0	1480.
1410	2.41	34.470	1396	27.539	63.2	2.31	54.9	25.54	69.89	0.0	1483.
1515	2.33	34.501	1500	27.570	60.6	2.23	51.9	26.20	79.62	0.0	1484.
2034	1.92	34.598	2011	27.680	50.8	1.78	41.2	29.06	131.26	0.0	1491.
2533	1.68	34.646*	2500	27.737	46.1	1.50	35.6	31.44	186.75	0.0	1498.
2993	1.65	34.655	2951	27.747	46.5	1.43	34.4	33.55	246.34	0.0	1506.
3398	1.62*	34.638	3347	27.735	48.6	1.36	35.3	35.47	308.99	0.0	1513.



OXYGEN, ML/L
0.00
2.00
4.00
6.00
8.00
10.00
SALINITY, 0/00
30.50
31.50
32.50
33.50
34.50
35.50
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 6 - 13

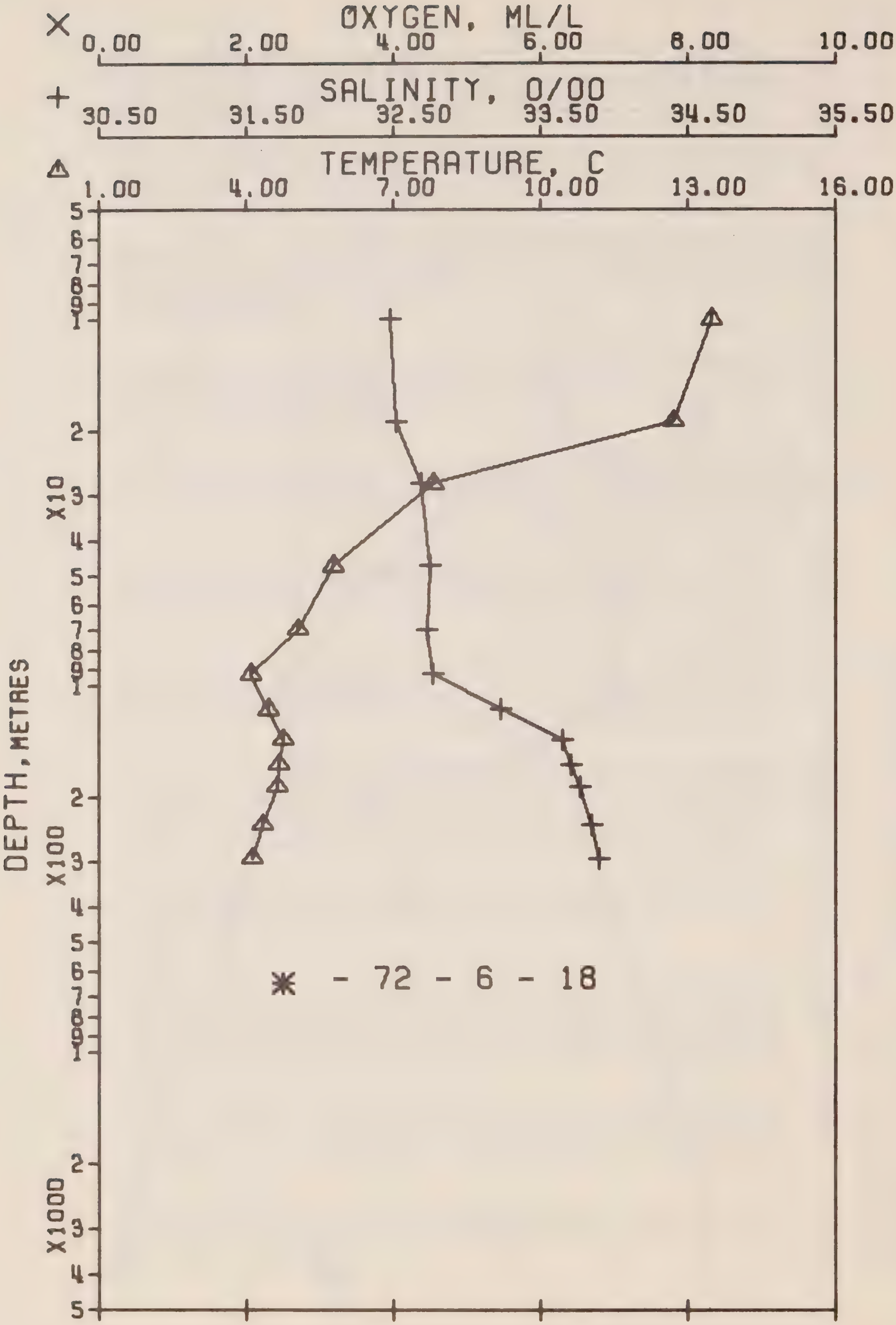
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 13 DATE 10/ 8/72
POSITION 50- 0.0 N. 145- 0.0 W GMT 1.2
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	13.32	32.467	0	24.393	354.7	13.32	354.5	0.0	0.0	6.26	1499.
9	13.32	32.467	9	24.393	354.9	13.32	354.5	0.32	0.01	6.29	1499.
19	13.27	32.467	19	24.403	354.2	13.27	353.5	0.68	0.07	6.31	1499.
28	10.70	32.567	28	24.959	301.4	10.70	300.5	0.98	0.14	6.94	1490.
47	6.56	32.714	47	25.703	230.7	6.56	229.8	1.48	0.33	7.13	1475.
70	5.61	32.714	70	25.820	219.6	5.60	218.6	1.98	0.64	7.06	1472.
93	5.36	32.736	92	25.867	215.4	5.35	214.2	2.47	1.04	6.99	1471.
116	4.86	33.088	115	26.202	183.7	4.85	182.4	2.94	1.54	6.39	1470.
138	4.99	33.626	137	26.613	145.1	4.98	143.4	3.30	2.00	5.39	1471.
161	4.78	33.712	160	26.704	136.6	4.77	134.6	3.62	2.49	4.55	1471.
183	4.68	33.759	182	26.753	132.2	4.67	130.1	3.92	3.01	3.91	1471.
229	4.17	33.791	227	26.833	124.7	4.15	122.5	4.50	4.24	2.89	1470.
274	3.91	33.856	272	26.911	117.6	3.89	115.0	5.05	5.64	2.02	1469.
368	3.87	33.994	365	27.024	107.6	3.84	104.2	6.10	9.08	1.37	1471.
469	3.66	34.077	465	27.111	100.0	3.63	95.9	7.14	13.53	1.01	1472.
581	3.56	34.134	576	27.167	95.5	3.52	90.5	8.24	19.40	1.10	1473.
781	3.25	34.277	774	27.310	83.1	3.20	76.9	10.03	31.79	0.67	1475.
980	2.93	34.359	971	27.405	74.9	2.86	67.8	11.59	45.85	0.60	1478.
1181	2.65	34.414	1169	27.473	68.9	2.57	61.2	13.03	61.67	0.75	1480.
1483	2.36	34.455	1467	27.531	64.1	2.26	55.7	15.03	88.91	0.81	1484.
1989	2.00	34.579	1965	27.659	53.1	1.86	43.3	17.98	140.96	1.24	1491.
2499	1.78	34.624	2466	27.712	48.9	1.60	38.0	20.56	199.93	1.95	1498.
3011	1.62	34.650	2967	27.745	46.5	1.40	34.6	22.99	268.15	2.59	1506.
3524	1.54	34.666	3469	27.764	45.7	1.27	32.5	25.34	346.69	2.98	1515.
4038	1.53	34.675*	3970	27.772	46.3	1.20	31.5	27.70	437.64	0.0	1523.
4140	1.53	34.677	4070	27.773	46.4	1.19	31.2	28.18	457.47	3.29	1525.
4243	1.54	34.680	4170	27.775	46.7	1.19	30.9	28.66	477.89	3.33	1527.


OXYGEN, ML/L
0.00 2.00 4.00 6.00 8.00 10.00
SALINITY, 0/00
30.50 31.50 32.50 33.50 34.50 35.50
TEMPERATURE, C
1.00 4.00 7.00 10.00 13.00 16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 6 - 17

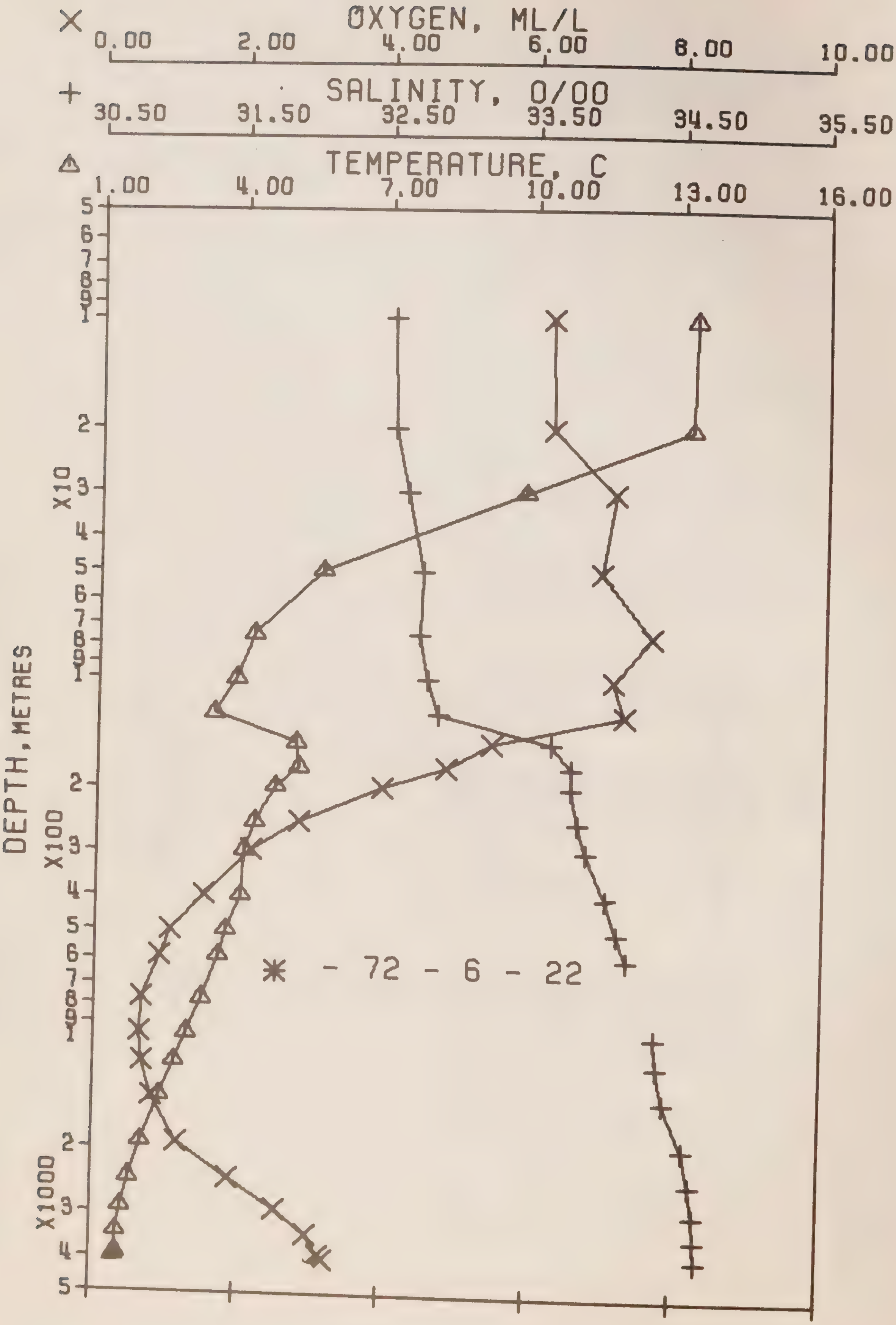
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 17 DATE 17/ 8/72
POSITION 50- 0.0 N. 145- 0.0 W GMT 0.2
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	13.53	32.485	0	24.365	357.4	13.53	357.2	0.0	0.0	6.31	1500.
10	13.52	32.485	10	24.367	357.5	13.52	356.9	0.36	0.02	6.27	1500.
19	13.39	32.487	19	24.395	355.1	13.39	354.3	0.69	0.07	6.30	1499.
29	8.57	32.662	29	25.380	261.3	8.57	260.6	1.00	0.14	7.47	1483.
49	6.82	32.710	49	25.665	234.2	6.82	233.4	1.47	0.34	7.17	1476.
73	5.51	32.711	73	25.830	218.7	5.50	217.7	2.01	0.68	7.05	1471.
99	4.82	32.716	98	25.912	211.1	4.81	209.9	2.55	1.15	7.05	1469.
124	4.94	33.030	123	26.147	189.1	4.93	187.6	3.06	1.73	6.43	1470.
148	5.23	33.562	147	26.535	152.7	5.22	150.8	3.47	2.30	5.76	1472.
173	5.04	33.721	172	26.682	138.9	5.03	136.8	3.84	2.89	5.05	1472.
198	4.68	33.781	197	26.770	130.7	4.66	128.3	4.18	3.53	3.85	1471.
248	4.33	33.828	246	26.845	123.8	4.31	121.2	4.80	4.95	2.84	1471.
297	4.08	33.888	295	26.919	117.2	4.06	114.2	5.40	6.61	2.15	1471.
397	3.81	33.991	394	27.028	107.4	3.78	103.8	6.51	10.56	1.38	1471.
495	3.64	34.084	491	27.119	99.5	3.61	95.2	7.53	15.17	0.85	1472.
598	3.50	34.188	593	27.215	91.0	3.46	85.9	8.51	20.62	0.74	1473.
799	3.18	34.293	792	27.329	81.3	3.12	75.0	10.23	32.89	0.62	1476.
1001	2.88	34.378	991	27.424	73.0	2.81	66.0	11.77	47.09	0.63	1478.
1202	2.60	34.428	1190	27.489	67.4	2.52	59.7	13.18	62.93	0.81	1480.
1507	2.30	34.505	1490	27.576	59.9	2.20	51.4	15.11	89.54	0.84	1484.
2014	1.98	34.587	1989	27.667	52.4	1.84	42.5	17.93	140.06	1.32	1491.
2523	1.75	34.627	2489	27.717	48.3	1.57	37.5	20.48	199.02	2.02	1498.
3032	1.61	34.659	2988	27.753	45.8	1.38	33.8	22.86	266.64	2.64	1507.
3543	1.54	34.676	3487	27.772	45.1	1.27	31.7	25.17	343.98	3.04	1515.
4053	1.53	34.674*	3985	27.771	46.4	1.20	31.5	27.51	434.60	3.04	1524.
4155	1.52	34.676	4084	27.773	46.3	1.18	31.2	27.98	454.32	3.28	1525.
4256	1.54	34.683	4183	27.777	46.5	1.19	30.7	28.45	474.55	3.35	1527.


ØXYGEN, ML/L
0.00 2.00 4.00 6.00 8.00 10.00
SALINITY, 0/00
30.50 31.50 32.50 33.50 34.50 35.50
TEMPERATURE, C
1.00 4.00 7.00 10.00 13.00 16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 6 - 18

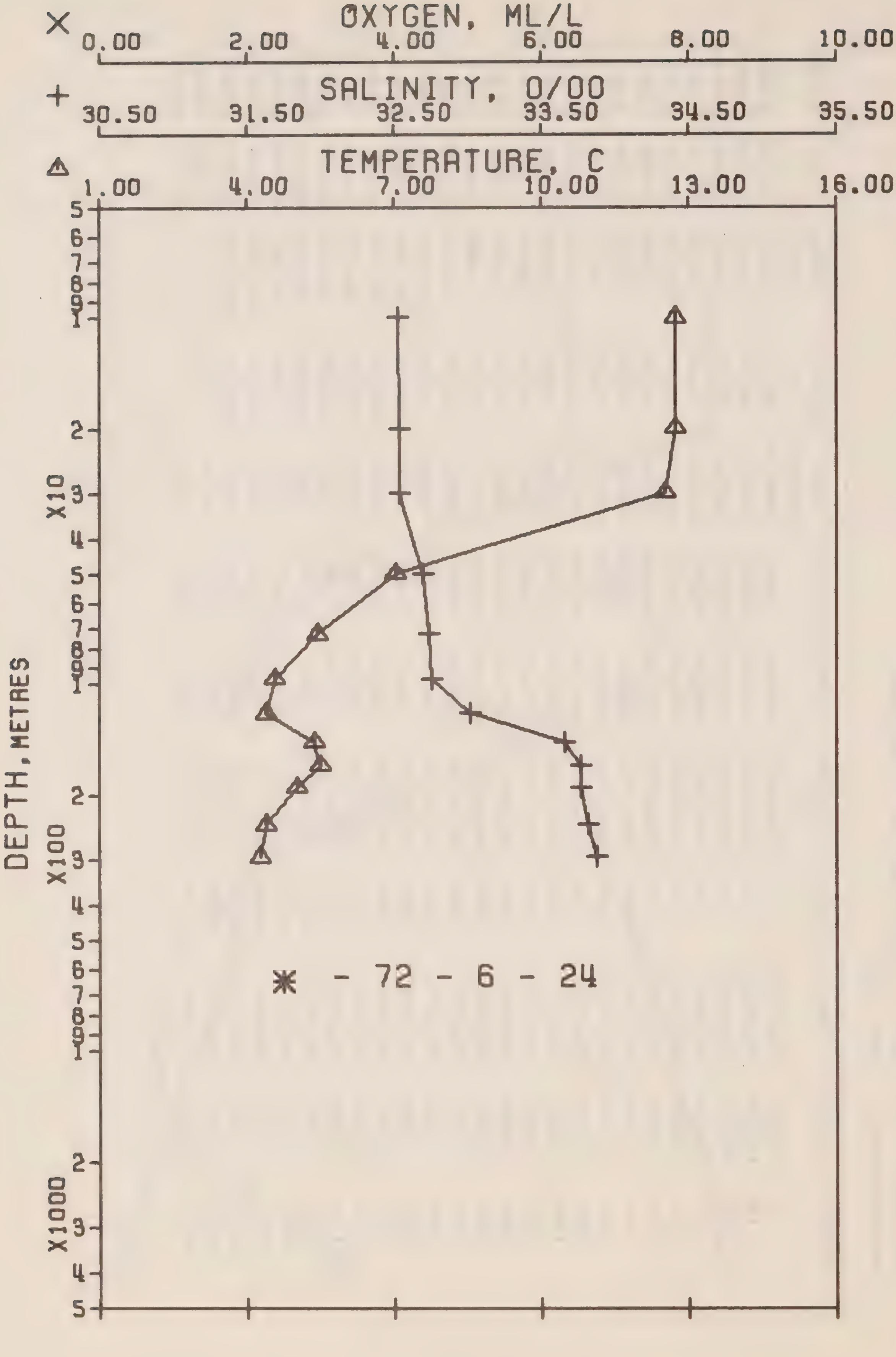
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 18 DATE 19/ 8/72
POSITION 50- 0.0 N. 145- 0.0 W GMT 19.3
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	13.51	32.482	0	24.367	357.2	13.51	357.0	0.0	0.0	0.0	1499.
10	13.47	32.485	10	24.377	356.5	13.47	356.0	0.36	0.02	0.0	1499.
19	12.69	32.520	19	24.558	339.5	12.69	338.7	0.68	0.07	0.0	1497.
28	7.80	32.688	28	25.513	248.5	7.80	247.8	0.95	0.13	0.0	1480.
47	5.76	32.750	47	25.831	218.4	5.76	217.7	1.36	0.29	0.0	1472.
70	5.05	32.732	70	25.899	212.1	5.04	211.2	1.86	0.59	0.0	1469.
94	4.10	32.771	93	26.030	199.6	4.09	198.7	2.34	0.99	0.0	1466.
117	4.45	33.232	116	26.360	168.6	4.44	167.3	2.77	1.45	0.0	1468.
141	4.76	33.646	140	26.654	141.1	4.75	139.4	3.14	1.94	0.0	1471.
165	4.67	33.711	164	26.716	135.5	4.66	133.6	3.47	2.46	0.0	1471.
189	4.63	33.774	188	26.770	130.6	4.62	128.3	3.79	3.04	0.0	1471.
241	4.32	33.846	239	26.860	122.3	4.30	119.7	4.44	4.46	0.0	1471.
297	4.13	33.896	295	26.920	117.1	4.11	114.0	5.11	6.31	0.0	1471.


OXYGEN, ML/L
0.00 2.00 4.00 6.00 8.00 10.00
SALINITY, 0/00
30.50 31.50 32.50 33.50 34.50 35.50
TEMPERATURE, C
1.00 4.00 7.00 10.00 13.00 16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 6 - 22

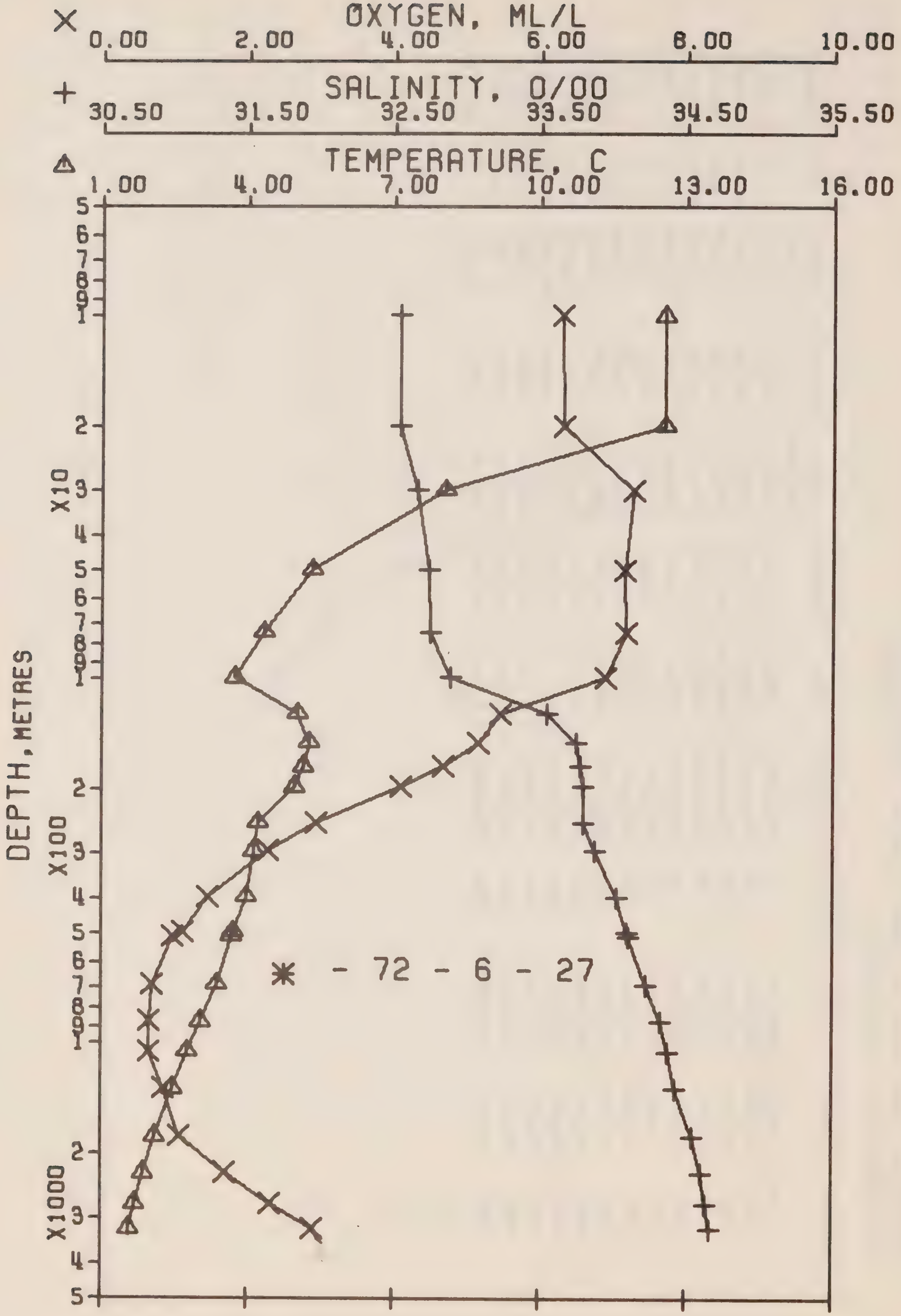
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 22 DATE 23/ 8/72
POSITION 50- 0.0 N. 145- 0.0 W GMT 20.2
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	13.25	32.523	0	24.451	349.2	13.25	349.0	0.0	0.0	6.22	1499.
10	13.27	32.516	10	24.441	350.4	13.27	349.9	0.35	0.02	6.22	1499.
20	13.20	32.526	20	24.463	348.5	13.20	347.8	0.71	0.07	6.24	1499.
30	9.79	32.619	30	25.153	282.9	9.79	282.1	1.03	0.15	7.10	1487.
50	5.63	32.727	50	25.828	218.7	5.63	217.9	1.51	0.35	6.92	1471.
75	4.20	32.714	75	25.975	204.8	4.19	203.9	2.03	0.69	7.62	1466.
101	3.84	32.769	100	26.055	197.3	3.83	196.4	2.54	1.15	7.09	1465.
126	3.40	32.851	125	26.161	187.2	3.39	186.3	3.03	1.71	7.26	1463.
151	5.10	33.627	150	26.601	146.3	5.09	144.4	3.45	2.30	5.43	1472.
176	5.18	33.771	175	26.706	136.8	5.17	134.5	3.80	2.89	4.82	1473.
200	4.69	33.773	199	26.763	131.4	4.67	129.1	4.12	3.51	3.93	1471.
251	4.26	33.825	249	26.850	123.4	4.24	120.7	4.76	4.98	2.81	1470.
301	4.07	33.884	299	26.917	117.4	4.05	114.4	5.37	6.69	2.14	1471.
402	4.01	34.022	399	27.033	107.3	3.98	103.4	6.50	10.74	1.50	1472.
504	3.70	34.098	500	27.124	99.2	3.66	94.6	7.55	15.60	1.05	1473.
593	3.54	34.173	588	27.199	92.6	3.50	87.5	8.40	20.36	0.89	1473.
781	3.22	34.296*	774	27.328	81.3	3.17	75.2	10.03	31.74	0.66	1475.
972	2.93	34.370	963	27.414	73.9	2.86	67.0	11.50	44.91	0.63	1477.
1165	2.68	34.391	1153	27.452	70.8	2.60	63.2	12.89	60.05	0.69	1480.
1458	2.38	34.440	1442	27.517	65.4	2.28	56.9	14.89	86.79	0.82	1483.
1954	2.02	34.584	1930	27.661	52.8	1.89	43.0	17.81	137.22	1.19	1490.
2458	1.78	34.630	2425	27.717	48.3	1.61	37.6	20.32	193.90	1.90	1498.
2965	1.62	34.658	2922	27.751	45.8	1.40	34.1	22.70	259.53	2.56	1505.
3474	1.55	34.675	3420	27.770	45.0	1.28	31.9			3.00	1514.
3981	1.53	34.677	3915	27.773	46.0	1.21	31.3			3.19	1522.


OXYGEN, ML/L
0.00
2.00
4.00
6.00
8.00
10.00
SALINITY, 0/00
30.50
31.50
32.50
33.50
34.50
35.50
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 6 - 24

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 24 DATE 27/ 8/72
POSITION 50- 0.0 N, 145- 0.0 W GMT 23.8
HYDROGRAPHIC CAST CATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	12.72	32.536	0	24.564	338.4	12.72	338.2	0.0	0.0	0.0	1497.
10	12.73	32.535	10	24.562	338.9	12.73	338.4	0.34	0.02	0.0	1497.
20	12.72	32.536	20	24.564	338.9	12.72	338.1	0.68	0.07	0.0	1497.
30	12.51	32.536	30	24.605	335.2	12.51	334.3	1.02	0.16	0.0	1497.
50	7.02	32.705	50	25.635	237.2	7.02	236.3	1.60	0.39	0.0	1477.
73	5.43	32.742	73	25.863	215.6	5.42	214.5	2.11	0.71	0.0	1471.
98	4.58	32.765	97	25.976	204.9	4.57	203.8	2.62	1.16	0.0	1468.
121	4.40	33.022	120	26.199	183.9	4.39	182.6	3.07	1.66	0.0	1468.
145	5.38	33.660	144	26.595	147.0	5.37	145.1	3.47	2.20	0.0	1473.
168	5.49	33.772	167	26.670	140.2	5.48	137.8	3.80	2.73	0.0	1474.
192	5.01	33.774	191	26.728	134.8	4.99	132.4	4.13	3.34	0.0	1473.
244	4.39	33.818	242	26.831	125.2	4.37	122.5	4.80	4.82	0.0	1471.
298	4.26	33.885	296	26.898	119.3	4.24	116.2	5.46	6.65	0.0	1471.


OXYGEN, ML/L
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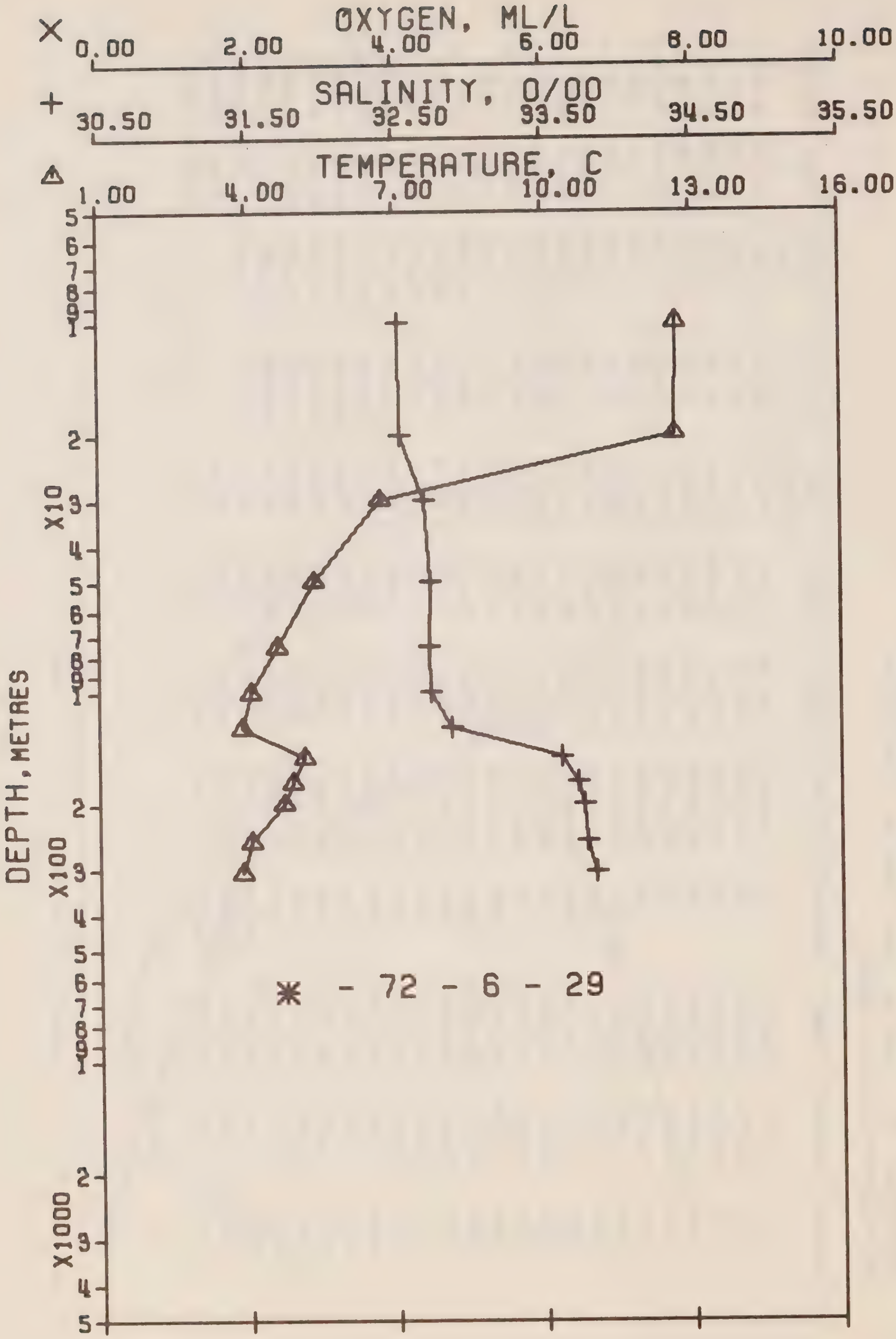
2.00
4.00
6.00
8.00
10.00
SALINITY, O/OO
30.50
31.50
32.50
33.50
34.50
35.50
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 6 - 27

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 27 DATE 30/ 8/72
POSITION 50- 0.0 N, 145- 0.0 W GMT 20.6
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	12.55	32.543	0	24.603	334.8	12.55	334.6	0.0	0.0	6.29	1496.
10	12.56	32.541	10	24.599	335.3	12.56	334.8	0.34	0.02	6.31	1496.
20	12.54	32.542	20	24.604	335.2	12.54	334.4	0.68	0.07	6.32	1497.
30	8.06	32.664	30	25.457	253.9	8.06	253.2	0.98	0.15	7.28	1481.
50	5.31	32.744	50	25.879	213.9	5.31	213.1	1.42	0.33	7.16	1470.
74	4.34	32.749	74	25.989	203.4	4.33	202.7	1.92	0.65	7.19	1466.
100	3.73	32.892	99	26.163	187.0	3.72	186.1	2.42	1.09	6.90	1464.
125	5.03	33.551	124	26.549	151.0	5.02	149.4	2.84	1.58	5.47	1471.
150	5.27	33.747	149	26.676	139.3	5.26	137.3	3.20	2.08	5.17	1473.
175	5.15	33.781	174	26.717	135.7	5.14	133.4	3.55	2.65	4.68	1473.
199	4.96	33.798	198	26.752	132.5	4.94	130.1	3.87	3.27	4.09	1472.
250	4.22	33.797	248	26.832	125.0	4.20	122.5	4.52	4.76	2.95	1470.
299	4.13	33.879	297	26.907	118.4	4.11	115.4	5.12	6.44	2.28	1471.
399	3.96	34.028	396	27.042	106.3	3.93	102.4	6.24	10.42	1.45	1472.
498	3.71	34.104	494	27.128	98.8	3.67	94.2	7.25	15.04	1.13	1473.
511	3.68	34.110	507	27.136	98.1	3.64	93.5	7.38	15.70	0.98	1473.
694	3.38	34.234	688	27.263	87.1	3.33	81.3	9.08	26.11	0.71	1475.
878	3.05	34.333	870	27.373	77.4	2.99	70.8	10.58	38.18	0.66	1476.
1064	2.77	34.377	1054	27.433	72.3	2.70	65.1	11.97	51.93	0.66	1478.
1346	2.47	34.427	1332	27.499	66.8	2.38	58.7	13.93	76.00	0.87	1482.
1822	2.10	34.554	1801	27.631	55.4	1.98	46.0	16.83	122.61	1.09	1488.
2304	1.86	34.608	2274	27.693	50.4	1.70	39.9	19.35	175.69	1.70	1495.
2788	1.69	34.642	2749	27.733	47.4	1.49	35.8			2.31	1503.
3274	1.57	34.667	3225	27.762	45.4	1.32	32.8			2.90	1511.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SALINITY, O/OO
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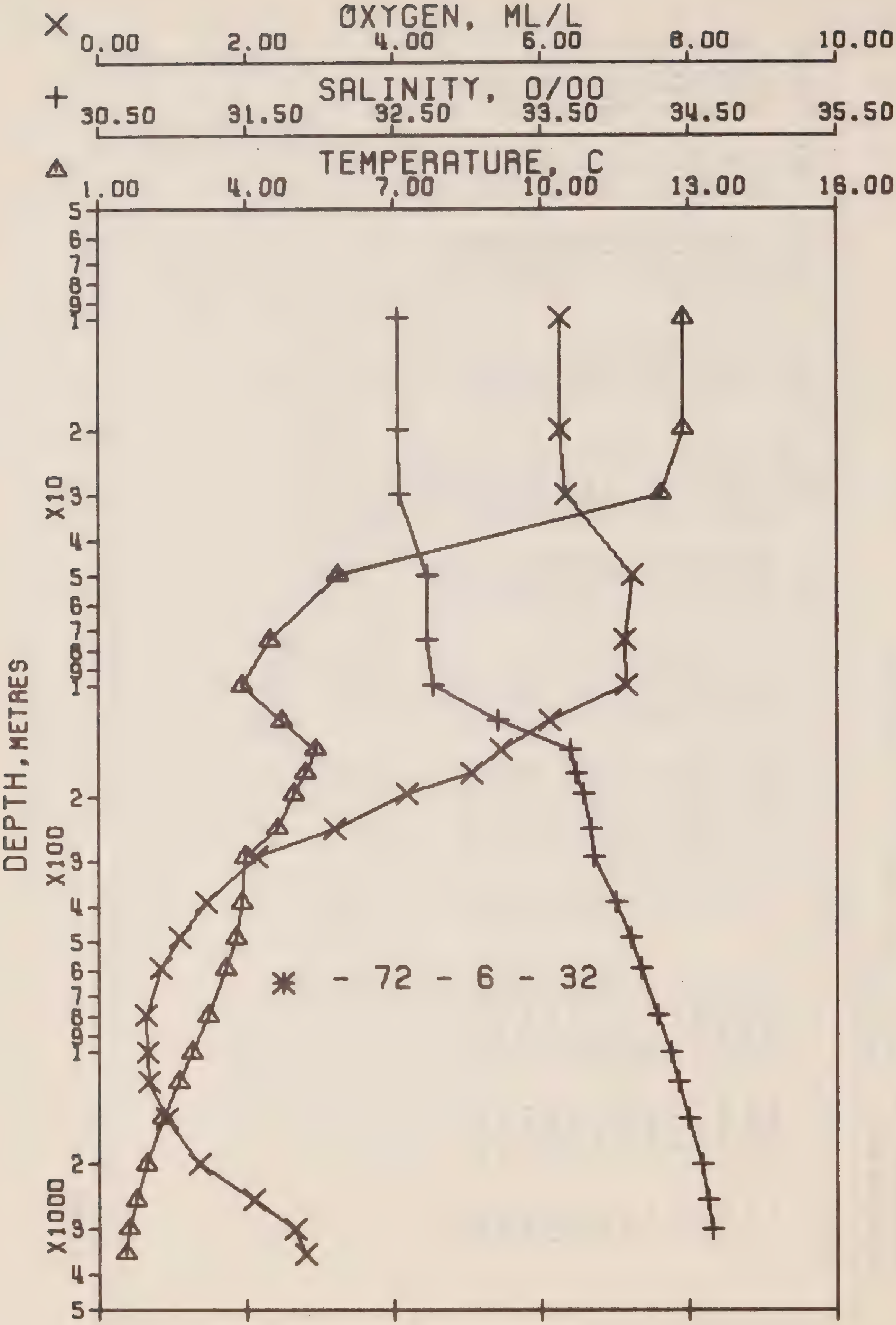
TEMPERATURE, C
1.00 4.00 7.00 10.00 13.00 16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 6 - 29

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 29 DATE 3/ 9/72
POSITION 50- 0.0 N. 145- 0.0 W GMT 19.0
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	12.69	32.532	0	24.567	338.1	12.69	337.9	0.0	0.0	0.0	1497.
10	12.69	32.532	10	24.567	338.4	12.69	337.9	0.34	0.02	0.0	1497.
20	12.68	32.536	20	24.572	338.2	12.68	337.4	0.69	0.07	0.0	1497.
30	6.70	32.697	30	25.671	233.4	6.70	232.8	0.98	0.14	0.0	1475.
50	5.36	32.743	50	25.872	214.4	5.36	213.7	1.39	0.32	0.0	1470.
75	4.61	32.731	75	25.946	207.6	4.60	206.7	1.92	0.66	0.0	1468.
101	4.07	32.745	100	26.013	201.3	4.06	200.3	2.44	1.12	0.0	1466.
126	3.88	32.878	125	26.137	189.7	3.87	188.5	2.94	1.70	0.0	1466.
151	5.15	33.619	150	26.589	147.5	5.14	145.6	3.36	2.29	0.0	1472.
176	4.89	33.728	175	26.705	136.8	4.88	134.6	3.71	2.88	0.0	1472.
201	4.71	33.768	200	26.756	132.0	4.69	129.7	4.05	3.53	0.0	1471.
255	4.07	33.786	253	26.839	124.4	4.05	121.8	4.73	5.12	0.0	1470.
310	3.87	33.854	308	26.913	117.7	3.85	114.8	5.40	7.05	0.0	1470.


OXYGEN, ML/L
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4.00
6.00
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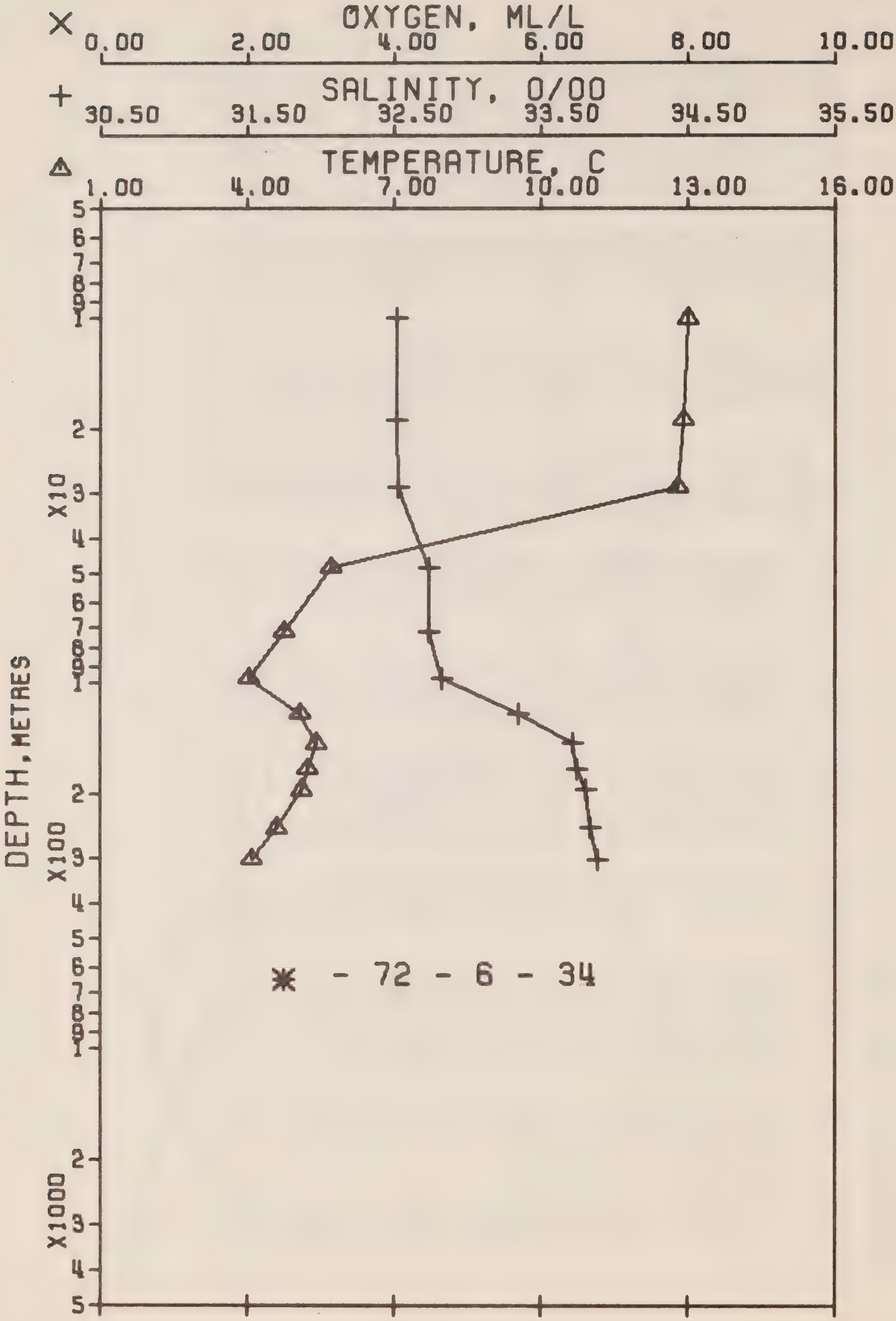
10.00
SALINITY, O/OO
30.50
31.50
32.50
33.50
34.50
35.50
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 6 - 32

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 32 DATE 6/ 9/72
POSITION 50- 0.0 N. 145- 0.0 W GMT 21.3
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	12.90	32.539	0	24.532	341.5	12.90	341.3	0.0	0.0	6.29	1497.
10	12.88	32.534	10	24.532	341.7	12.88	341.3	0.34	0.02	6.26	1498.
20	12.87	32.532	20	24.532	342.0	12.87	341.2	0.69	0.07	6.26	1498.
30	12.42	32.539	30	24.624	333.4	12.42	332.4	1.03	0.16	6.34	1496.
50	5.87	32.732	50	25.803	221.1	5.87	220.2	1.59	0.38	7.24	1472.
75	4.49	32.732	75	25.960	206.3	4.48	205.4	2.11	0.72	7.15	1467.
101	3.90	32.769	100	26.049	197.8	3.89	197.0	2.62	1.18	7.16	1465.
126	4.73	33.209	125	26.312	173.4	4.72	172.0	3.09	1.72	6.12	1470.
150	5.41	33.701	149	26.623	144.4	5.40	142.3	3.47	2.26	5.46	1473.
174	5.20	33.745	173	26.683	139.0	5.19	136.7	3.81	2.82	5.06	1473.
199	4.96	33.792	198	26.748	133.0	4.94	130.5	4.15	3.47	4.19	1472.
248	4.64	33.837	246	26.819	126.5	4.62	123.7	4.78	4.90	3.19	1472.
296	3.98	33.863	294	26.909	118.0	3.96	115.1	5.37	6.54	2.14	1470.
393	3.92	34.006	390	27.029	107.5	3.89	103.7	6.46	10.35	1.46	1472.
491	3.78	34.111	487	27.127	98.9	3.75	94.4	7.46	14.89	1.10	1473.
597	3.57	34.176	592	27.199	92.6	3.53	87.5	8.48	20.52	0.84	1474.
803	3.21	34.292	796	27.326	81.6	3.15	75.4	10.27	33.30	0.64	1476.
1010	2.88	34.378	1000	27.424	73.1	2.81	66.0	11.86	47.99	0.66	1478.
1215	2.61	34.431	1203	27.490	67.4	2.53	59.5	13.30	64.32	0.69	1480.
1523	2.30	34.497	1506	27.569	60.6	2.20	52.0	15.26	91.65	0.92	1484.
2035	1.97	34.586	2010	27.667	52.4	1.83	42.5	18.12	143.60	1.36	1491.
2545	1.74	34.627	2511	27.718	48.4	1.56	37.4	20.68	203.24	2.11	1499.
3056	1.61	34.657	3011	27.751	46.0	1.38	34.0	23.08	271.79	2.66	1507.
3565	1.54	34.687*	3509	27.780	44.4	1.26	30.9	25.38	349.35	2.81	1515.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+ SALINITY, 0/00
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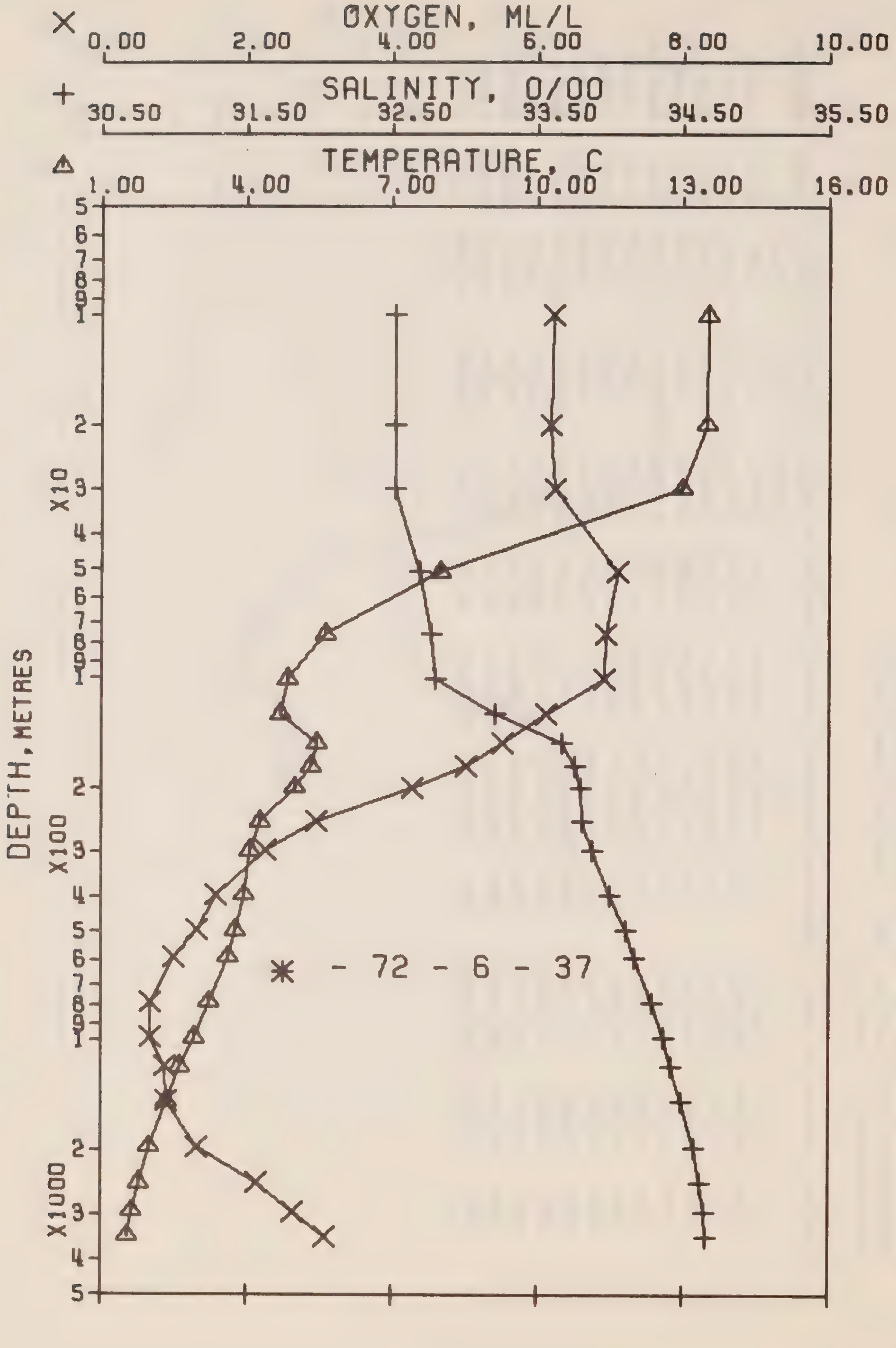
△ TEMPERATURE, C
1.00 4.00 7.00 10.00 13.00 16.00
DEPTH, METRES
X10
X100
X1000
✱ - 72 - 6 - 34

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 34 DATE 10/ 9/72
POSITION 50- 0.0 N. 145- 0.0 W GMT 19.0
HYDROGRAPHIC CAST CATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	12.99	32.522	0	24.501	344.4	12.99	344.2	0.0	0.0	0.0	1498.
10	12.99	32.522	10	24.501	344.7	12.99	344.2	0.35	0.02	0.0	1498.
19	12.92	32.524	19	24.516	343.4	12.92	342.7	0.66	0.06	0.0	1498.
29	12.80	32.526	29	24.541	341.3	12.80	340.3	1.00	0.15	0.0	1498.
48	5.71	32.736	48	25.826	218.9	5.71	218.2	1.55	0.36	0.0	1472.
72	4.76	32.740	72	25.937	208.5	4.75	207.6	2.04	0.67	0.0	1468.
98	4.02	32.832	97	26.087	194.2	4.01	193.3	2.55	1.11	0.0	1466.
122	5.07	33.348	121	26.384	166.6	5.06	165.1	2.99	1.60	0.0	1471.
147	5.40	33.717	146	26.637	143.0	5.39	141.0	3.37	2.12	0.0	1473.
172	5.24	33.750	171	26.682	139.0	5.23	136.8	3.72	2.70	0.0	1473.
197	5.12	33.808	196	26.742	133.6	5.10	131.1	4.07	3.35	0.0	1473.
251	4.59	33.838	249	26.825	125.9	4.57	123.1	4.76	4.93	0.0	1472.
306	4.10	33.890	304	26.918	117.3	4.08	114.2	5.43	6.84	0.0	1471.



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SALINITY, 0/00
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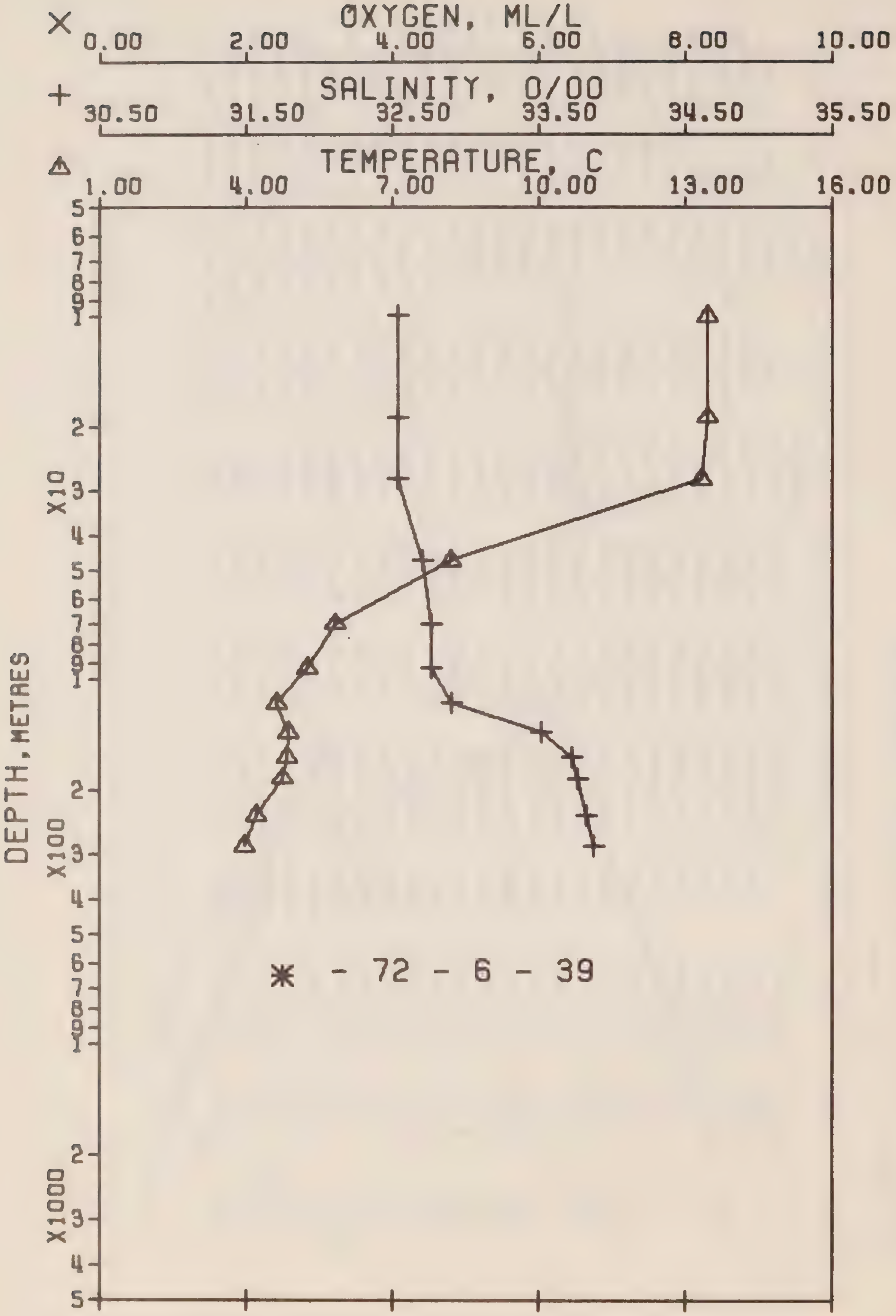
TEMPERATURE, C
1.00 4.00 7.00 10.00 13.00 16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 6 - 37

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 37 DATE 13/ 9/72
POSITION 50- 0.0 N. 145- 0.0 W GMT 20.6
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	13.52	32.522	0	24.396	354.5	13.52	354.3	0.0	0.0	6.22	1500.
10	13.50	32.522	10	24.400	354.4	13.50	353.8	0.36	0.02	6.22	1500.
20	13.49	32.522	20	24.402	354.4	13.49	353.6	0.71	0.07	6.19	1500.
30	12.97	32.523	30	24.506	344.7	12.97	343.7	1.07	0.16	6.24	1498.
51	7.98	32.686	51	25.486	251.5	7.97	250.4	1.70	0.42	7.10	1481.
76	5.63	32.775	76	25.866	215.4	5.62	214.3	2.27	0.80	6.95	1472.
102	4.84	32.803	101	25.978	204.8	4.83	203.7	2.80	1.28	6.92	1469.
127	4.70	33.211	126	26.316	173.0	4.69	171.5	3.28	1.83	6.13	1469.
152	5.43	33.668	151	26.595	147.1	5.42	145.0	3.68	2.40	5.51	1473.
176	5.31	33.756	175	26.679	139.4	5.30	137.0	4.02	2.98	5.02	1473.
201	4.98	33.800	200	26.752	132.6	4.96	130.1	4.36	3.63	4.27	1473.
251	4.26	33.815	249	26.842	124.1	4.24	121.5	4.99	5.09	2.96	1470.
301	4.06	33.876	299	26.911	117.9	4.04	114.9	5.60	6.80	2.27	1471.
400	3.94	34.003	397	27.025	107.9	3.91	104.1	6.72	10.79	1.58	1472.
501	3.77	34.112	497	27.128	98.8	3.73	94.2	7.76	15.57	1.32	1473.
595	3.60	34.171	590	27.192	93.4	3.56	88.1	8.66	20.60	0.99	1474.
792	3.22	34.292	785	27.325	81.7	3.17	75.4	10.38	32.75	0.69	1476.
991	2.91	34.370	981	27.415	73.8	2.84	66.8	11.92	46.71	0.68	1478.
1190	2.61	34.424	1178	27.485	67.8	2.53	60.1	13.32	62.36	0.87	1480.
1490	2.36	34.493	1474	27.561	61.4	2.26	52.8	15.26	88.75	0.89	1484.
1992	2.00	34.582	1968	27.661	52.8	1.86	43.0	18.10	139.17	1.32	1491.
2496	1.77	34.623	2463	27.712	48.8	1.59	38.0	20.64	197.39	2.15	1498.
2999	1.62	34.652	2956	27.746	46.3	1.40	34.4	23.02	264.12	2.63	1506.
3502	1.54	34.664	3447	27.762	45.8	1.27	32.7	25.33	340.61	3.08	1514.



OXYGEN, ML/L
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4.00
6.00
8.00
10.00
SALINITY, 0/00
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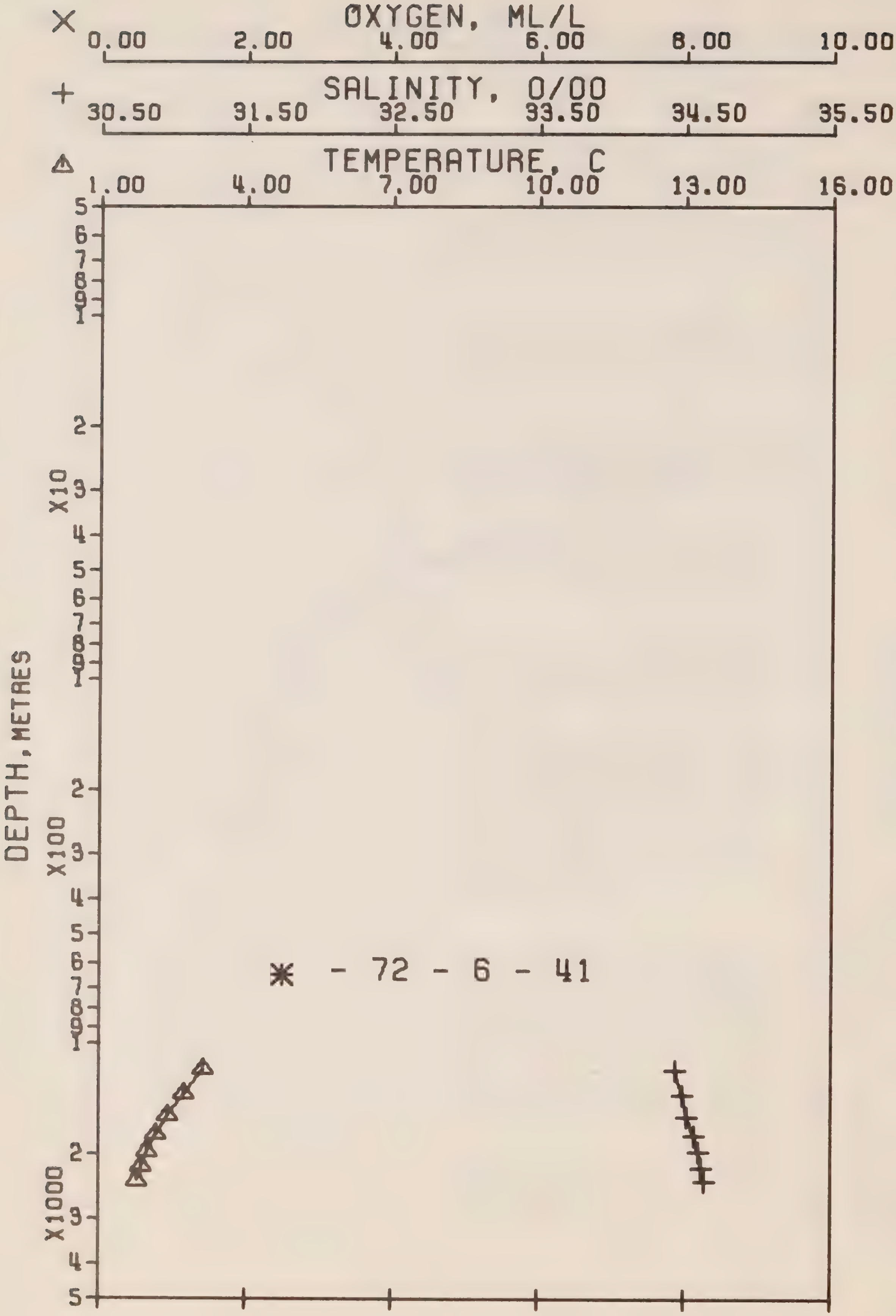
31.50
32.50
33.50
34.50
35.50
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 6 - 39

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 39 DATE 17/ 9/72
POSITION 50- 0.0 N. 145- 0.0 W GMT 0.8
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	13.46	32.539	0	24.421	352.0	13.46	351.8	0.0	0.0	0.0	1499.
10	13.46	32.536	10	24.419	352.6	13.46	352.0	0.35	0.02	0.0	1500.
19	13.44	32.536	19	24.423	352.4	13.44	351.6	0.67	0.07	0.0	1500.
28	13.32	32.538	28	24.448	350.2	13.32	349.2	0.99	0.14	0.0	1499.
47	8.21	32.712	47	25.473	252.7	8.21	251.7	1.58	0.36	0.0	1482.
70	5.82	32.770	70	25.839	217.9	5.81	216.8	2.10	0.68	0.0	1473.
94	5.25	32.770	93	25.906	211.7	5.24	210.5	2.60	1.10	0.0	1471.
117	4.63	32.914	116	26.089	194.4	4.62	193.1	3.07	1.61	0.0	1469.
140	4.87	33.525	139	26.546	151.4	4.86	149.6	3.47	2.13	0.0	1471.
164	4.85	33.729	163	26.710	136.1	4.84	134.1	3.82	2.66	0.0	1471.
187	4.74	33.768	186	26.753	132.2	4.73	130.0	4.13	3.21	0.0	1471.
237	4.22	33.826	235	26.855	122.8	4.20	120.3	4.75	4.57	0.0	1470.
288	3.97	33.876	286	26.921	116.8	3.95	114.0	5.37	6.21	0.0	1470.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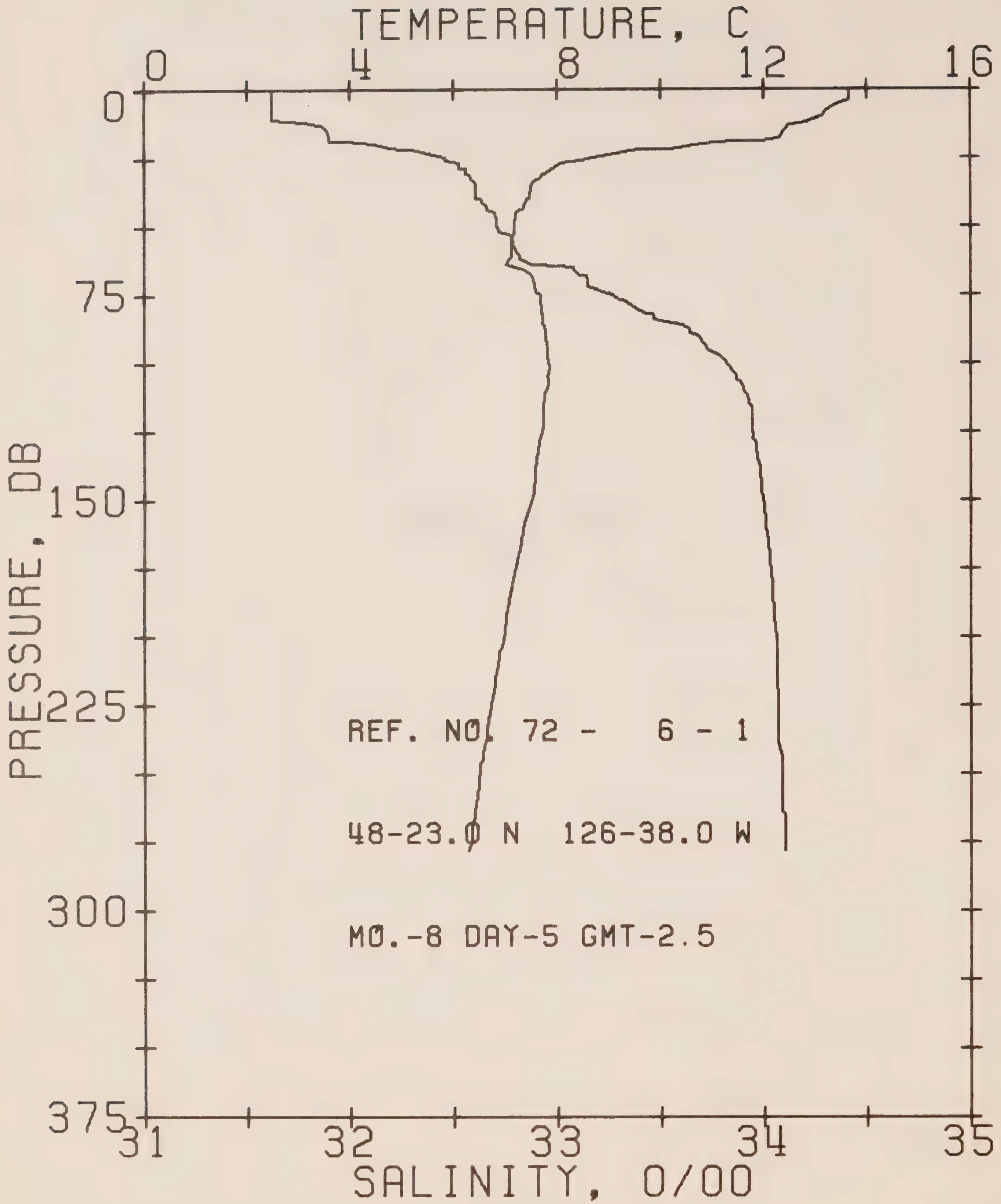
6.00
8.00
10.00
SALINITY, 0/00
30.50
31.50
32.50
33.50
34.50
35.50
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
* - 72 - 6 - 41

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 41 DATE 19/ 9/72
POSITION 48-46.0 N. 127-40.0 W GMT 19.2
HYDROGRAPHIC CAST CATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	13.28	31.995	0	24.037	388.7	13.28	388.5	0.0	0.0	0.0	1498.
1184	3.12	34.440	1174	27.452	72.2	3.04	63.2	25.08	56.39	0.0	1482.
1387	2.74	34.493	1374	27.529	65.2	2.64	55.8	26.46	74.61	0.0	1484.
1591	2.41	34.519	1575	27.578	60.5	2.30	51.1	27.74	94.05	0.0	1486.
1795	2.18	34.566	1776	27.634	55.4	2.06	45.6	28.92	114.45	0.0	1488.
2001	1.98	34.600	1978	27.677	51.4	1.84	41.5	30.01	135.58	0.0	1491.
2206	1.86	34.624	2180	27.706	48.9	1.71	38.7	31.04	157.61	0.0	1494.
2412	1.79	34.640	2382	27.724	47.6	1.62	36.9	32.03	180.94	0.0	1497.

RESULTS OF STD CASTS
(P-72-6)


TEMPERATURE, C
0
4
8
12
16
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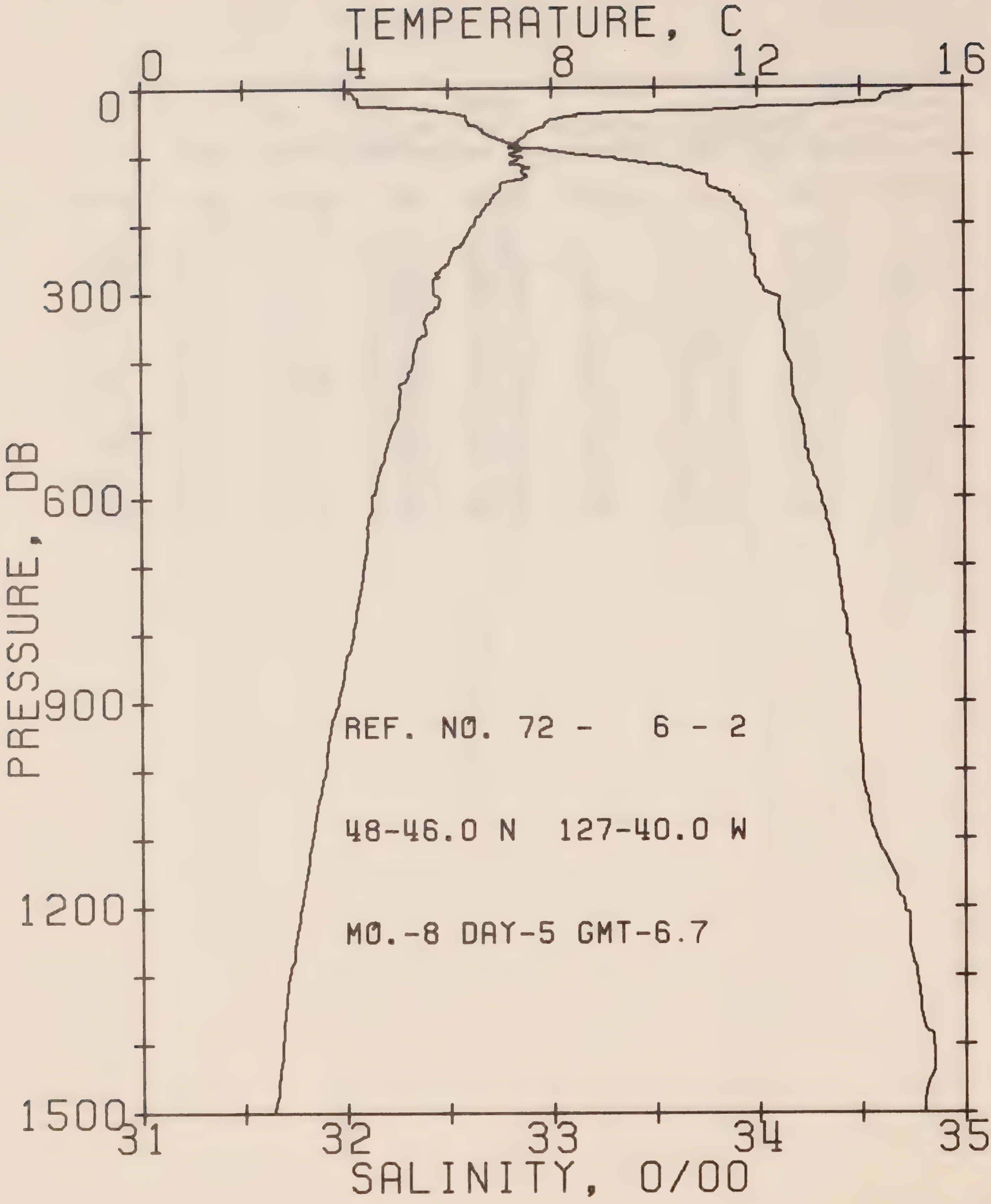
75
150
225
300
375
PRESSURE, DB
31
32
33
34
35
SALINITY, 0/00
REF. NO. 72 - 6 - 1
48-23.0 N 126-38.0 W
MO.-8 DAY-5 GMT-2.5

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 1 DATE 5/ 8/72
POSITION 48-23.0N, 126-38.0W GMT 2. 5
RESULTS OF STP CAST 134 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	13.66	31.62	0	23.67	423.2	0.0	0.0	1499.
10	13.13	31.62	10	23.78	413.7	0.42	0.02	1497.
20	10.81	32.12	20	24.59	336.1	0.80	0.08	1490.
30	7.82	32.56	30	25.41	258.3	1.09	0.15	1480.
50	7.17	32.71	50	25.62	238.8	1.58	0.35	1478.
75	7.68	33.27	75	25.99	204.2	2.14	0.71	1481.
100	7.85	33.82	99	26.39	166.1	2.60	1.11	1482.
125	7.71	33.94	124	26.51	155.3	2.99	1.57	1482.
150	7.50	34.00	149	26.58	149.0	3.37	2.10	1482.
175	7.19	34.03	174	26.66	142.3	3.74	2.70	1481.
200	6.96	34.06	199	26.71	137.6	4.09	3.37	1481.
225	6.72	34.07	223	26.75	134.0	4.43	4.10	1480.
250	6.49	34.09	248	26.79	129.9	4.76	4.90	1480.


TEMPERATURE, C
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8
12
16
PRESSURE, DB
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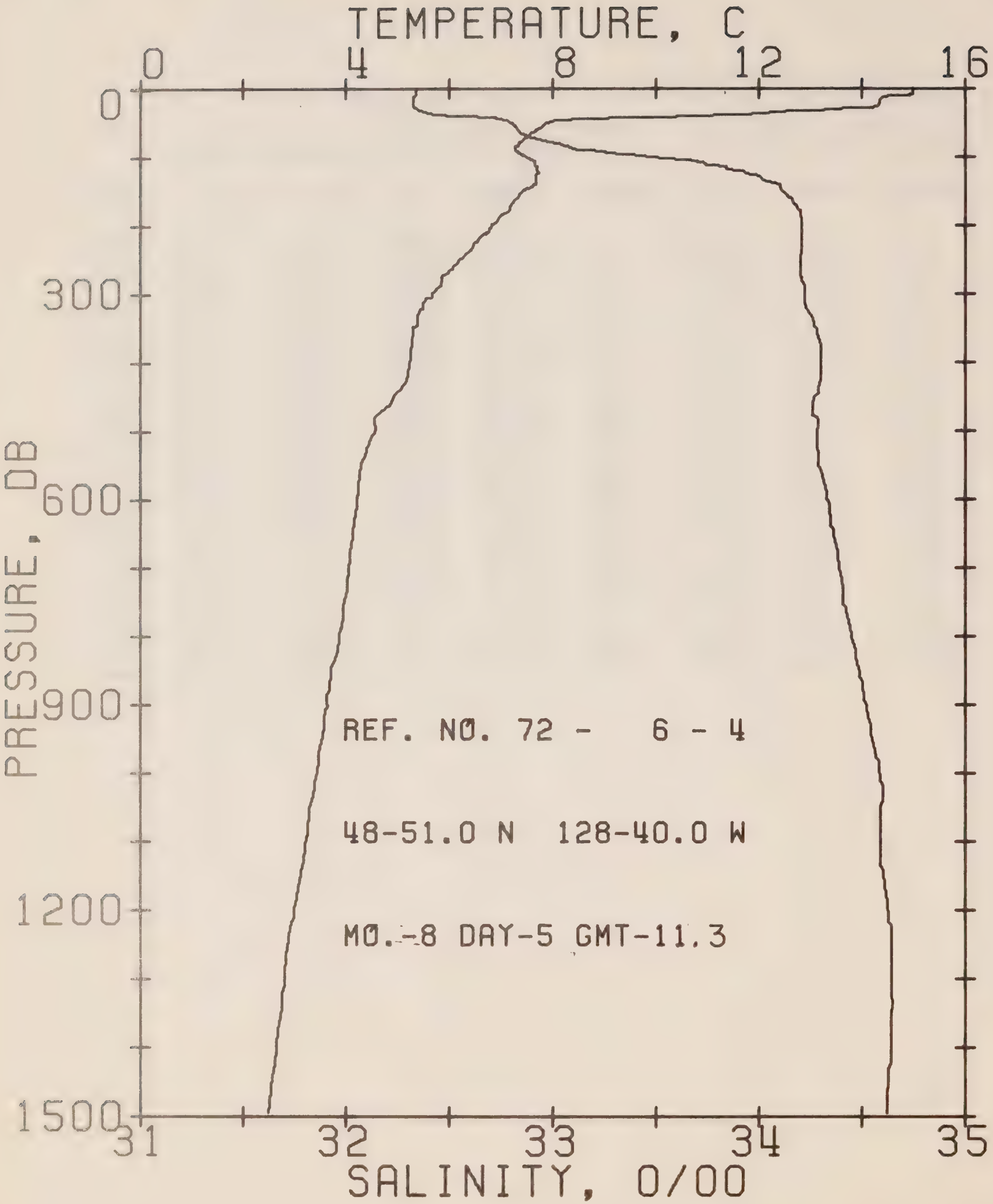
300
600
900
1200
1500
REF. NO. 72 - 6 - 2
48-46.0 N 127-40.0 W
MO.-8 DAY-5 GMT-6.7
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 2 DATE 5/ 8/72
POSITION 48-46.0N, 127-40.0W GMT 6.7
RESULTS OF STP CAST 310 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	14.97	32.02	0	23.71	419.8	0.0	0.0	1504.
10	14.47	32.04	10	23.83	408.7	0.42	0.02	1502.
20	14.36	32.06	20	23.87	405.3	0.82	0.08	1502.
30	12.00	32.35	30	24.56	339.7	1.21	0.18	1495.
50	7.93	32.59	50	25.42	257.7	1.77	0.41	1480.
75	7.38	32.75	75	25.62	238.9	2.39	0.80	1479.
100	7.25	33.20	99	25.99	204.1	2.96	1.30	1479.
125	7.46	33.71	124	26.36	169.2	3.42	1.83	1481.
150	6.99	33.81	149	26.51	155.8	3.83	2.40	1480.
175	6.71	33.92	174	26.63	144.6	4.20	3.02	1479.
200	6.50	33.95	199	26.68	139.7	4.55	3.70	1479.
225	6.29	33.96	223	26.72	136.7	4.90	4.44	1479.
250	6.02	33.98	248	26.77	131.8	5.24	5.26	1478.
300	5.71	34.04	298	26.85	124.4	5.88	7.05	1478.
400	5.30	34.15	397	26.99	112.8	7.05	11.23	1478.
500	4.89	34.22	496	27.09	103.4	8.13	16.19	1478.
600	4.51	34.30	595	27.20	93.7	9.12	21.73	1478.
800	4.14	34.43	793	27.34	81.8	10.87	34.14	1480.
1000	3.57	34.50	991	27.46	71.7	12.38	47.94	1481.
1200	3.09	34.71	1188	27.67	52.4	13.64	62.04	1482.


TEMPERATURE, C
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16
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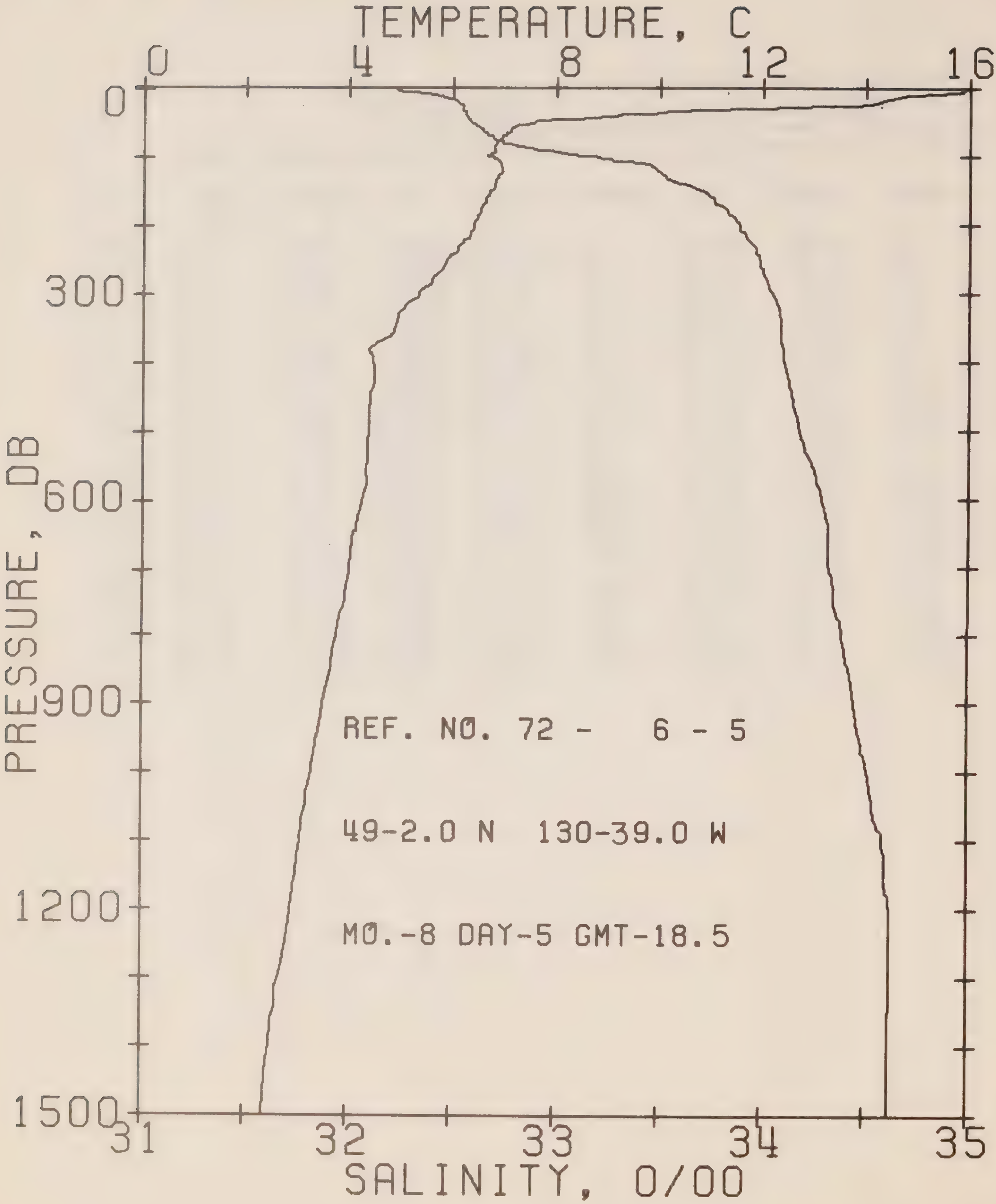
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 6 - 4
48-51.0 N 128-40.0 W
MO.-8 DAY-5 GMT-11.3
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 4 DATE 5/ 8/72
POSITION 48-51.0N, 128-40.0W GMT 11.3
RESULTS OF STP CAST 300 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	14.98	32.33	0	23.94	397.3	0.0	0.0	1504.
10	14.93	32.34	10	23.96	396.0	0.40	0.02	1504.
20	14.33	32.33	20	24.08	385.0	0.78	0.08	1502.
30	13.61	32.34	30	24.24	370.0	1.17	0.18	1500.
50	7.93	32.80	50	25.58	242.3	1.77	0.42	1481.
75	7.44	32.94	75	25.76	225.3	2.36	0.79	1479.
100	7.47	33.45	99	26.16	188.0	2.88	1.26	1480.
125	7.68	33.96	124	26.53	153.8	3.30	1.74	1482.
150	7.41	34.11	149	26.69	138.9	3.67	2.25	1482.
175	7.17	34.19	174	26.78	130.4	4.00	2.80	1481.
200	6.82	34.21	199	26.85	124.6	4.32	3.41	1481.
225	6.51	34.21	223	26.89	120.9	4.63	4.08	1480.
250	6.21	34.20	248	26.92	118.1	4.93	4.80	1479.
300	5.69	34.22	298	27.00	110.7	5.50	6.40	1478.
400	5.23	34.30	397	27.12	100.4	6.54	10.10	1478.
500	4.58	34.28	496	27.18	94.9	7.52	14.61	1476.
600	4.22	34.33	595	27.26	88.4	8.44	19.74	1477.
800	3.87	34.45	793	27.39	77.3	10.10	31.55	1479.
1000	3.43	34.58	990	27.54	63.9	11.51	44.42	1480.
1200	2.99	34.62	1188	27.61	57.2	12.73	58.09	1482.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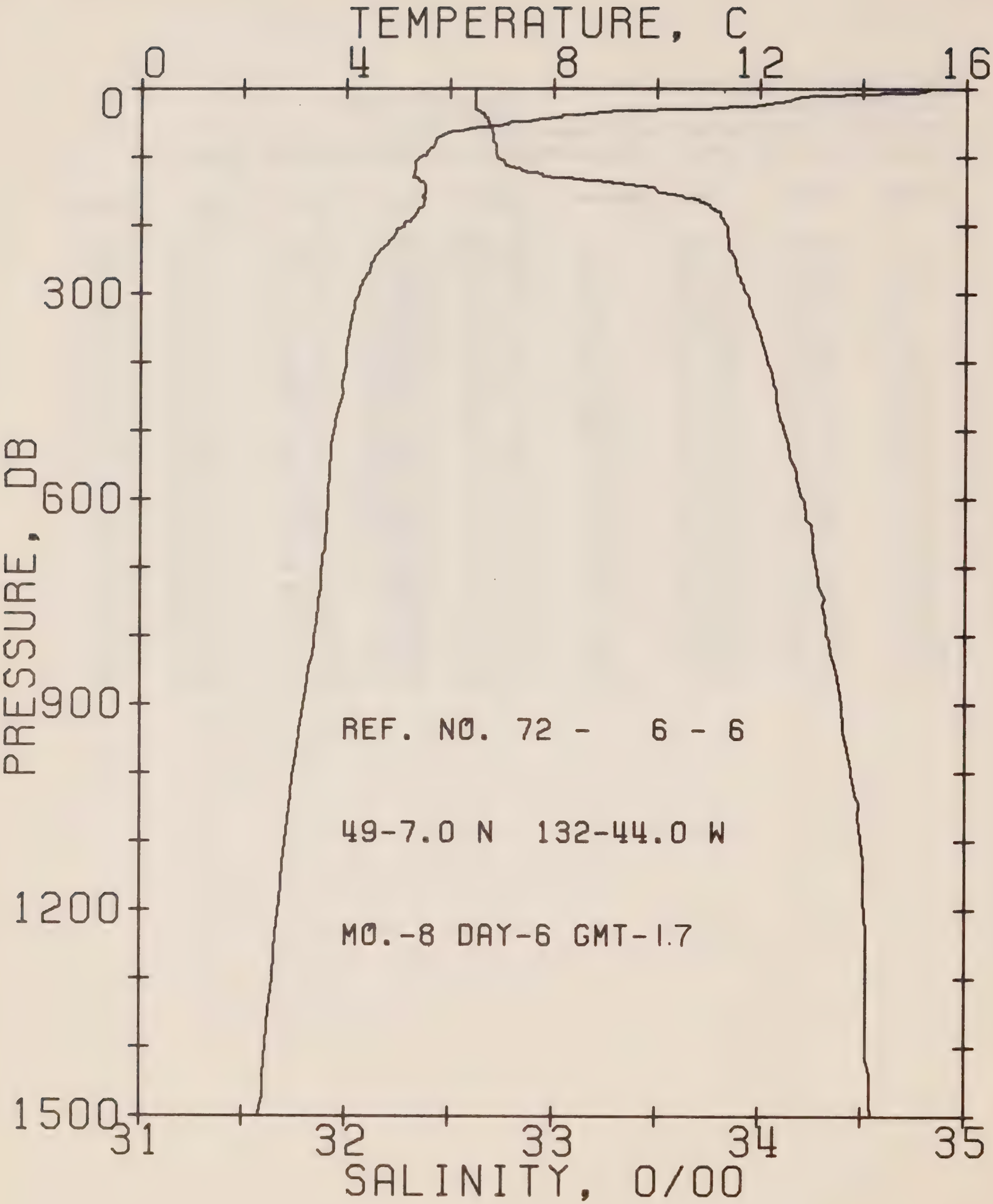
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 6 - 5
49-2.0 N 130-39.0 W
MO.-8 DAY-5 GMT-18.5
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 5 DATE 5/ 8/72
POSITION 49- 2.0N, 130-39.0W GMT 18.5
RESULTS OF STP CAST 256 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	15.91	32.21	0	23.65	425.5	0.0	0.0	1507.
10	14.90	32.40	10	24.02	391.0	0.42	0.02	1504.
20	14.26	32.52	20	24.24	369.6	0.80	0.08	1502.
30	12.26	32.55	30	24.66	329.6	1.15	0.17	1496.
50	7.56	32.59	50	25.47	252.9	1.72	0.40	1479.
75	6.94	32.70	75	25.64	237.1	2.32	0.78	1477.
100	6.67	33.14	99	26.02	200.9	2.88	1.28	1477.
125	6.91	33.51	124	26.28	176.8	3.35	1.81	1479.
150	6.75	33.70	149	26.45	161.2	3.77	2.41	1479.
175	6.55	33.81	174	26.57	150.6	4.16	3.05	1479.
200	6.41	33.89	199	26.65	143.0	4.53	3.75	1479.
225	6.21	33.94	223	26.71	137.2	4.88	4.52	1478.
250	5.92	33.98	248	26.78	130.8	5.21	5.32	1477.
300	5.36	34.04	298	26.90	119.9	5.84	7.09	1476.
400	4.48	34.10	397	27.05	106.4	6.96	11.05	1474.
500	4.39	34.18	496	27.12	100.7	7.99	15.79	1476.
600	4.27	34.29	595	27.22	92.1	8.96	21.19	1477.
800	3.80	34.39	793	27.35	80.9	10.69	33.53	1478.
1000	3.29	34.51	990	27.50	67.5	12.18	47.11	1480.
1200	2.91	34.63	1188	27.62	56.3	13.40	60.82	1481.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16
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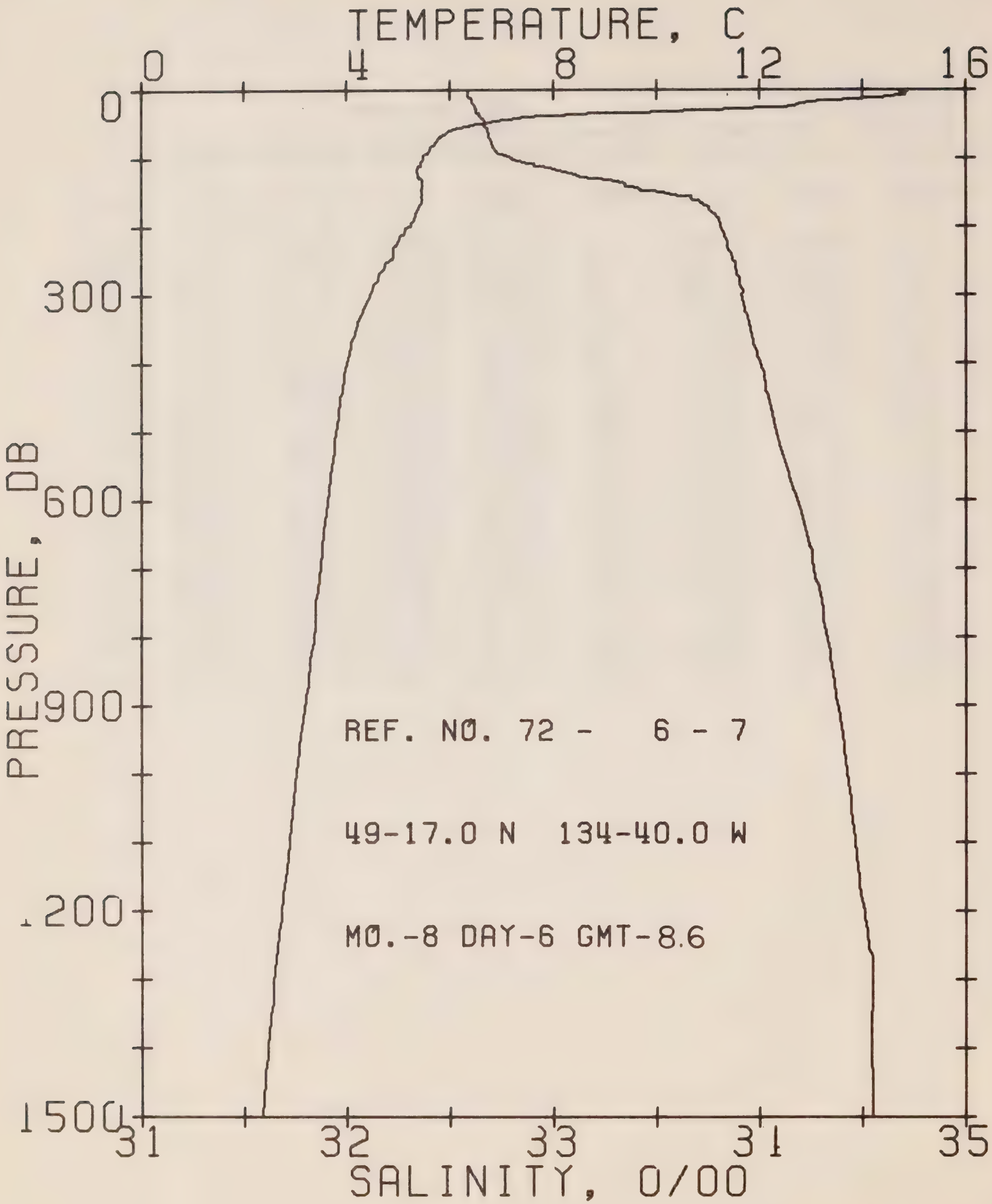
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 6 - 6
49-7.0 N 132-44.0 W
MO.-8 DAY-6 GMT-1.7
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 6 DATE 6/ 8/72
POSITION 49- 7.0N. 132-44.0W GMT 1.7
RESULTS OF STP CAST 233 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	15.25	32.63	0	24.12	380.9	0.0	0.0	1505.
10	13.65	32.62	10	24.45	350.0	0.37	0.02	1500.
20	12.44	32.62	20	24.68	327.5	0.71	0.07	1496.
30	10.84	32.62	30	24.98	299.8	1.02	0.15	1491.
50	7.12	32.69	50	25.61	239.6	1.54	0.36	1477.
75	5.72	32.71	75	25.80	221.3	2.11	0.72	1472.
100	5.41	32.73	99	25.86	216.5	2.66	1.21	1471.
125	5.32	32.94	124	26.04	199.6	3.19	1.81	1472.
150	5.53	33.50	149	26.45	160.6	3.63	2.44	1474.
175	5.42	33.76	174	26.67	140.0	4.00	3.05	1474.
200	5.12	33.83	199	26.76	131.5	4.34	3.69	1473.
225	4.81	33.85	223	26.81	127.2	4.66	4.39	1472.
250	4.53	33.88	248	26.86	122.4	4.98	5.15	1472.
300	4.24	33.93	298	26.94	115.5	5.57	6.82	1471.
400	4.01	34.04	397	27.04	106.1	6.67	10.74	1472.
500	3.77	34.12	496	27.13	98.3	7.69	15.42	1473.
600	3.65	34.21	595	27.22	91.0	8.64	20.71	1474.
800	3.40	34.33	793	27.34	80.7	10.35	32.88	1477.
1000	2.97	34.45	990	27.47	68.7	11.84	46.49	1478.
1200	2.70	34.51	1188	27.55	62.2	13.13	60.96	1480.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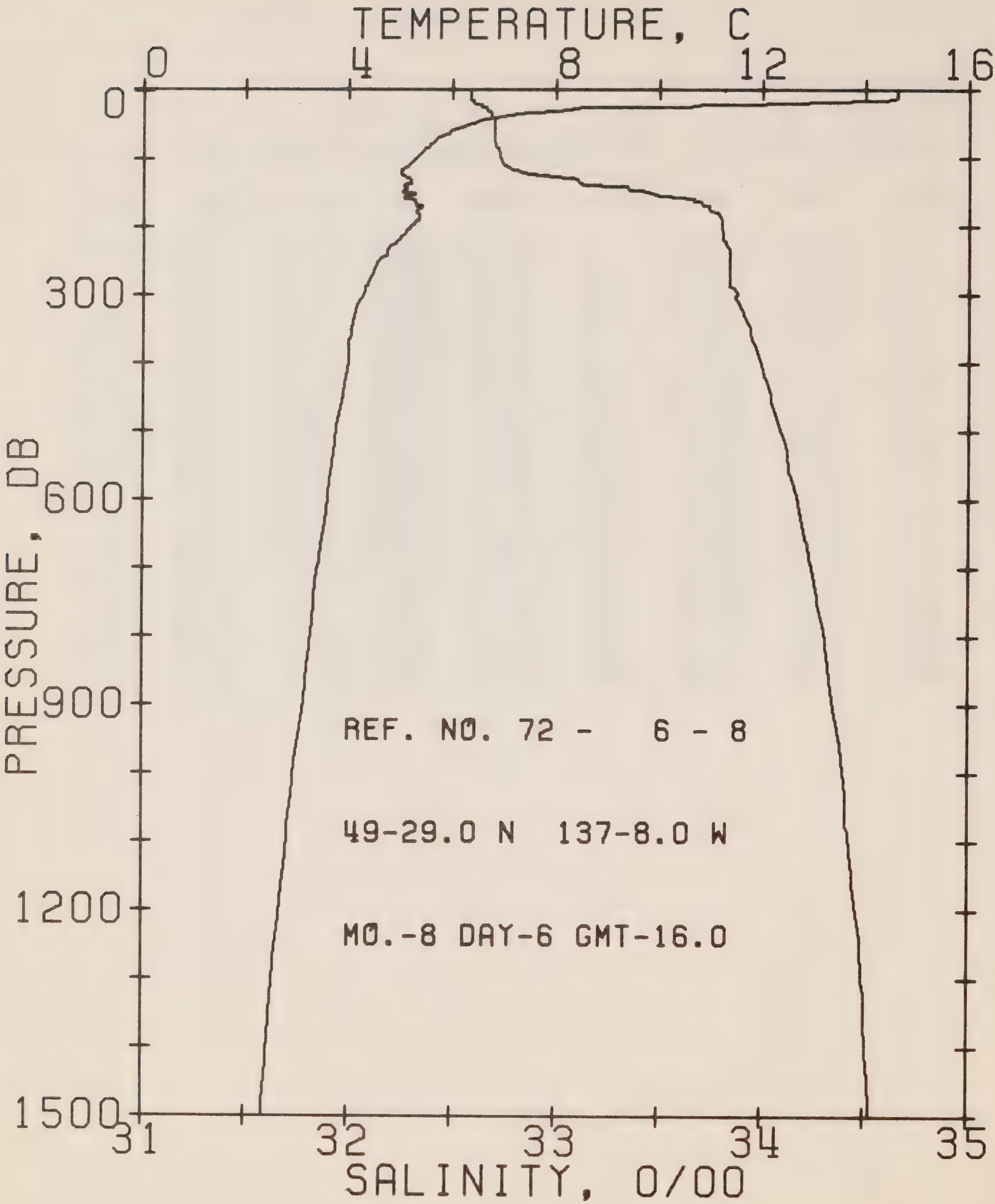
PRESSURE, DB
REF. NØ. 72 - 6 - 7
49-17.0 N 134-40.0 W
MØ.-8 DAY-6 GMT-8.6
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 7 DATE 6/ 8/72
POSITION 49-17.0N, 134-40.0W GMT 8.6
RESULTS OF STP CAST 206 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	14.88	32.58	0	24.16	376.9	0.0	0.0	1504.
10	14.55	32.59	10	24.24	369.9	0.38	0.02	1503.
20	12.84	32.61	20	24.60	335.6	0.73	0.07	1498.
30	11.29	32.63	30	24.90	306.7	1.05	0.16	1492.
50	6.68	32.67	50	25.65	235.5	1.57	0.36	1476.
75	5.75	32.70	75	25.79	222.5	2.13	0.72	1472.
100	5.49	32.80	99	25.90	212.2	2.68	1.21	1472.
125	5.39	33.12	124	26.17	187.3	3.19	1.79	1472.
150	5.46	33.50	149	26.46	160.0	3.62	2.39	1473.
175	5.36	33.75	174	26.67	140.4	3.99	3.00	1474.
200	5.23	33.81	199	26.73	134.6	4.33	3.66	1474.
225	4.95	33.84	223	26.79	129.6	4.66	4.37	1473.
250	4.84	33.87	248	26.82	126.3	4.98	5.15	1473.
300	4.45	33.91	298	26.90	119.5	5.59	6.86	1472.
400	3.99	34.00	397	27.02	108.7	6.73	10.91	1472.
500	3.79	34.08	496	27.10	101.5	7.78	15.72	1473.
600	3.63	34.18	595	27.19	93.2	8.76	21.18	1474.
800	3.35	34.33	793	27.34	80.6	10.48	33.44	1476.
1000	3.01	34.42	990	27.45	71.0	11.99	47.29	1478.
1200	2.72	34.51	1188	27.54	62.8	13.34	62.36	1480.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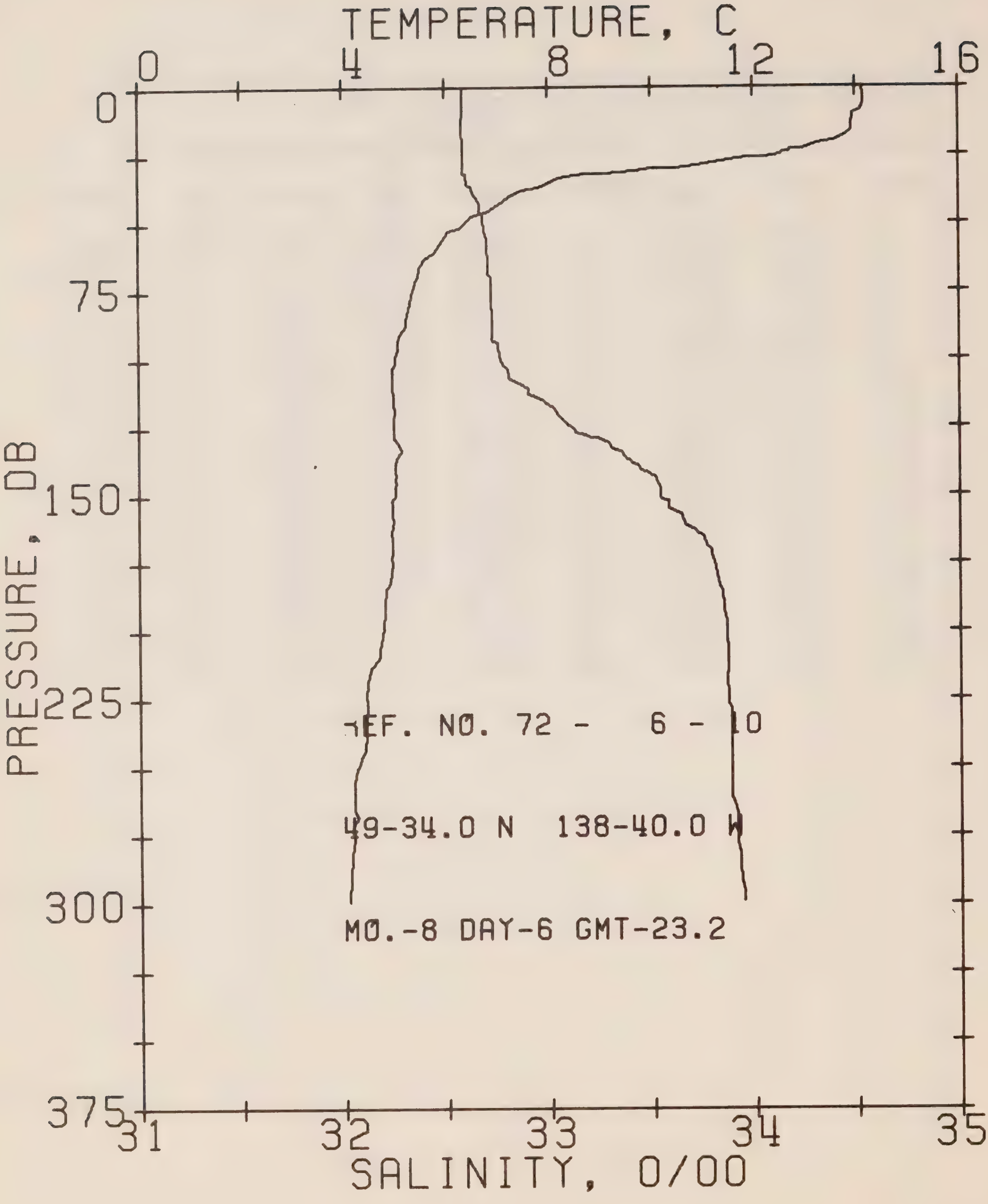
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 6 - 8
49-29.0 N 137-8.0 W
MO.-8 DAY-6 GMT-16.0
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 8 DATE 6/ 8/72
POSITION 49-29.0N, 137- 8.0W GMT 16.0
RESULTS OF STP CAST 205 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	14.62	32.59	0	24.22	370.9	0.0	0.0	1503.
10	14.62	32.59	10	24.22	371.4	0.37	0.02	1503.
20	12.87	32.60	20	24.58	337.0	0.73	0.07	1498.
30	8.23	32.67	30	25.44	255.8	1.02	0.15	1481.
50	6.43	32.70	50	25.71	230.2	1.50	0.34	1475.
75	5.66	32.70	75	25.80	221.3	2.06	0.70	1472.
100	5.31	32.73	99	25.87	215.4	2.61	1.19	1471.
125	5.03	32.94	124	26.07	196.8	3.13	1.79	1470.
150	5.05	33.42	149	26.45	161.0	3.58	2.42	1472.
175	5.38	33.74	174	26.66	141.3	3.95	3.03	1474.
200	5.21	33.80	199	26.72	135.3	4.30	3.69	1474.
225	4.91	33.82	223	26.77	130.6	4.63	4.41	1473.
250	4.60	33.84	248	26.83	125.9	4.95	5.18	1472.
300	4.30	33.88	298	26.89	120.1	5.57	6.91	1472.
400	3.98	33.99	397	27.01	109.2	6.71	10.98	1472.
500	3.76	34.09	496	27.11	100.4	7.76	15.78	1473.
600	3.59	34.17	595	27.19	93.2	8.73	21.21	1474.
800	3.27	34.30	793	27.33	81.3	10.47	33.60	1476.
1000	2.93	34.40	990	27.44	72.1	12.01	47.69	1478.
1200	2.68	34.46	1188	27.51	66.1	13.40	63.23	1480.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8
12
16
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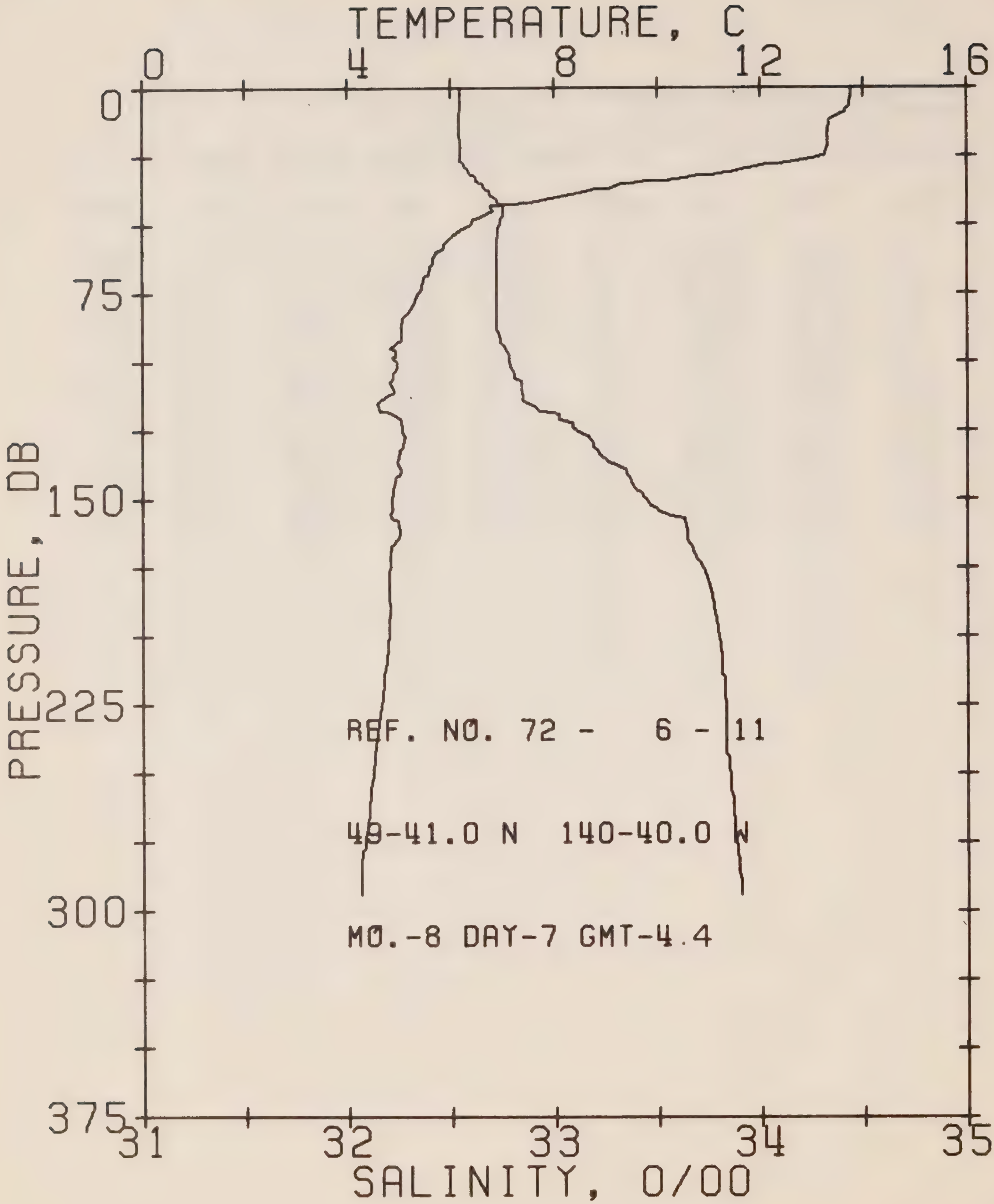
75
150
225
300
375
PRESSURE, DB
31
32
33
34
35
SALINITY, 0/00
¬EF. NØ. 72 - 6 - 10
49-34.0 N 138-40.0 W
MØ.-8 DAY-6 GMT-23.2

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 10 DATE 6/ 8/72
POSITION 49-34.0N. 138-40.0W GMT 23.2
RESULTS OF STP CAST 157 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	14.13	32.59	0	24.32	361.1	0.0	0.0	1502.
10	13.95	32.59	10	24.36	358.0	0.36	0.02	1501.
20	13.57	32.59	20	24.44	350.9	0.72	0.07	1500.
30	10.48	32.59	30	25.02	296.1	1.04	0.16	1490.
50	6.38	32.68	50	25.70	231.0	1.54	0.36	1474.
75	5.36	32.72	75	25.85	216.4	2.10	0.71	1471.
100	5.00	32.76	99	25.93	209.4	2.63	1.18	1470.
125	4.99	33.11	124	26.20	183.6	3.12	1.75	1470.
150	5.01	33.54	149	26.54	151.9	3.53	2.32	1472.
175	4.95	33.80	174	26.75	132.0	3.88	2.90	1472.
200	4.75	33.86	199	26.82	125.6	4.21	3.51	1472.
225	4.45	33.87	223	26.87	121.8	4.51	4.18	1471.
250	4.25	33.88	248	26.89	119.1	4.82	4.91	1470.


TEMPERATURE, C
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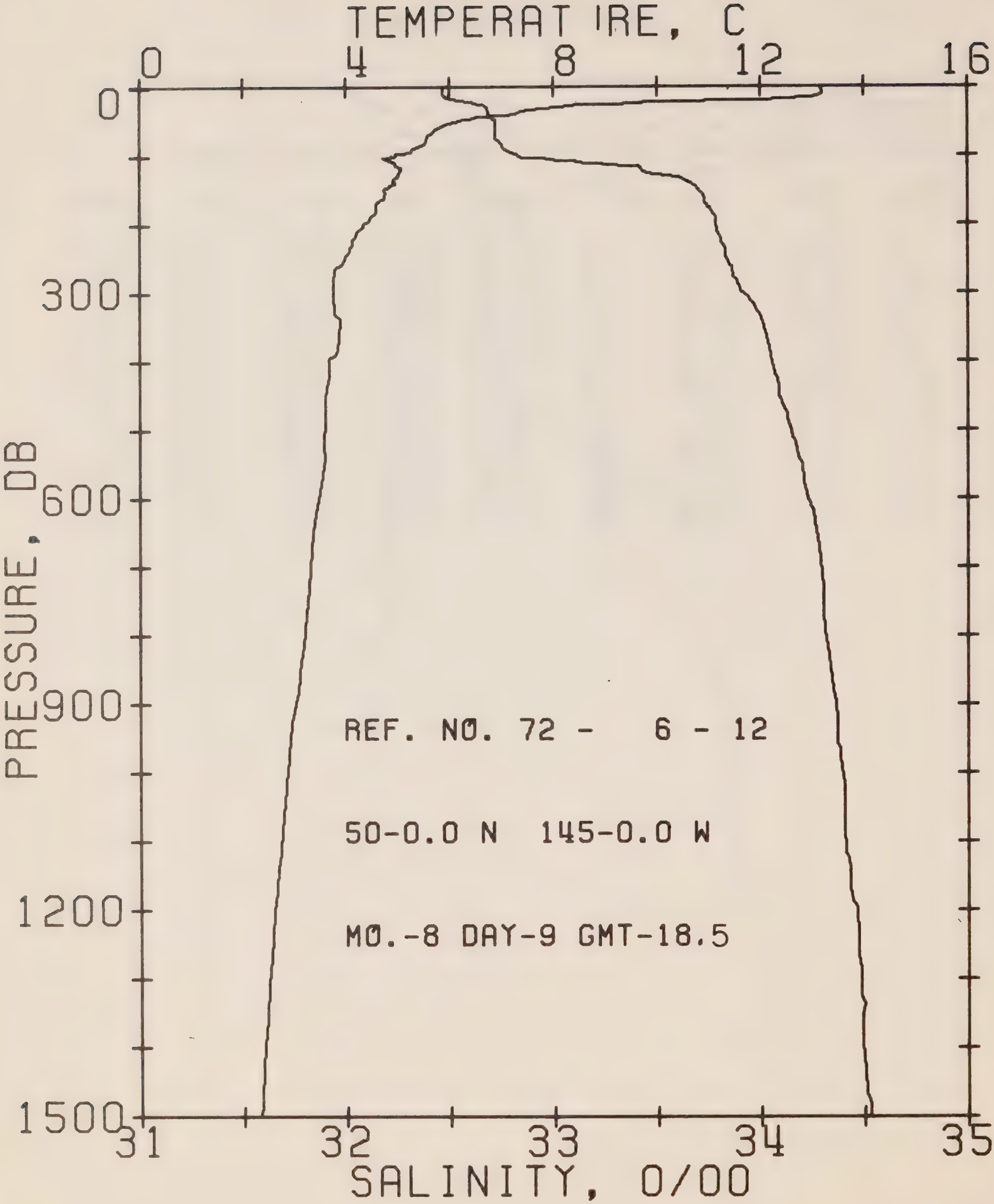
12
16
0
75
150
225
300
375
PRESSURE, DB
REF. NO. 72 - 6 - 11
49-41.0 N 140-40.0 W
MO.-8 DAY-7 GMT-4.4
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 11 DATE 7/ 8/72
POSITION 49-41.0N, 140-40.0W GMT 4.4
RESULTS OF STP CAST 165 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	13.75	32.54	0	24.36	357.4	0.0	0.0	1500.
10	13.52	32.54	10	24.41	353.4	0.36	0.02	1500.
20	13.30	32.55	20	24.46	348.9	0.71	0.07	1499.
30	11.59	32.58	30	24.81	315.5	1.05	0.16	1493.
50	6.38	32.74	50	25.75	226.6	1.56	0.36	1474.
75	5.37	32.72	75	25.85	216.6	2.11	0.71	1471.
100	4.95	32.78	99	25.95	207.7	2.64	1.19	1469.
125	5.08	33.11	124	26.19	184.6	3.14	1.75	1471.
150	4.86	33.44	149	26.48	157.7	3.56	2.35	1471.
175	4.81	33.71	174	26.70	136.8	3.93	2.95	1471.
200	4.79	33.79	199	26.77	130.9	4.26	3.59	1472.
225	4.64	33.83	223	26.81	126.9	4.58	4.28	1472.
250	4.47	33.85	248	26.84	124.0	4.90	5.05	1471.


TEMPERAT IRE, C
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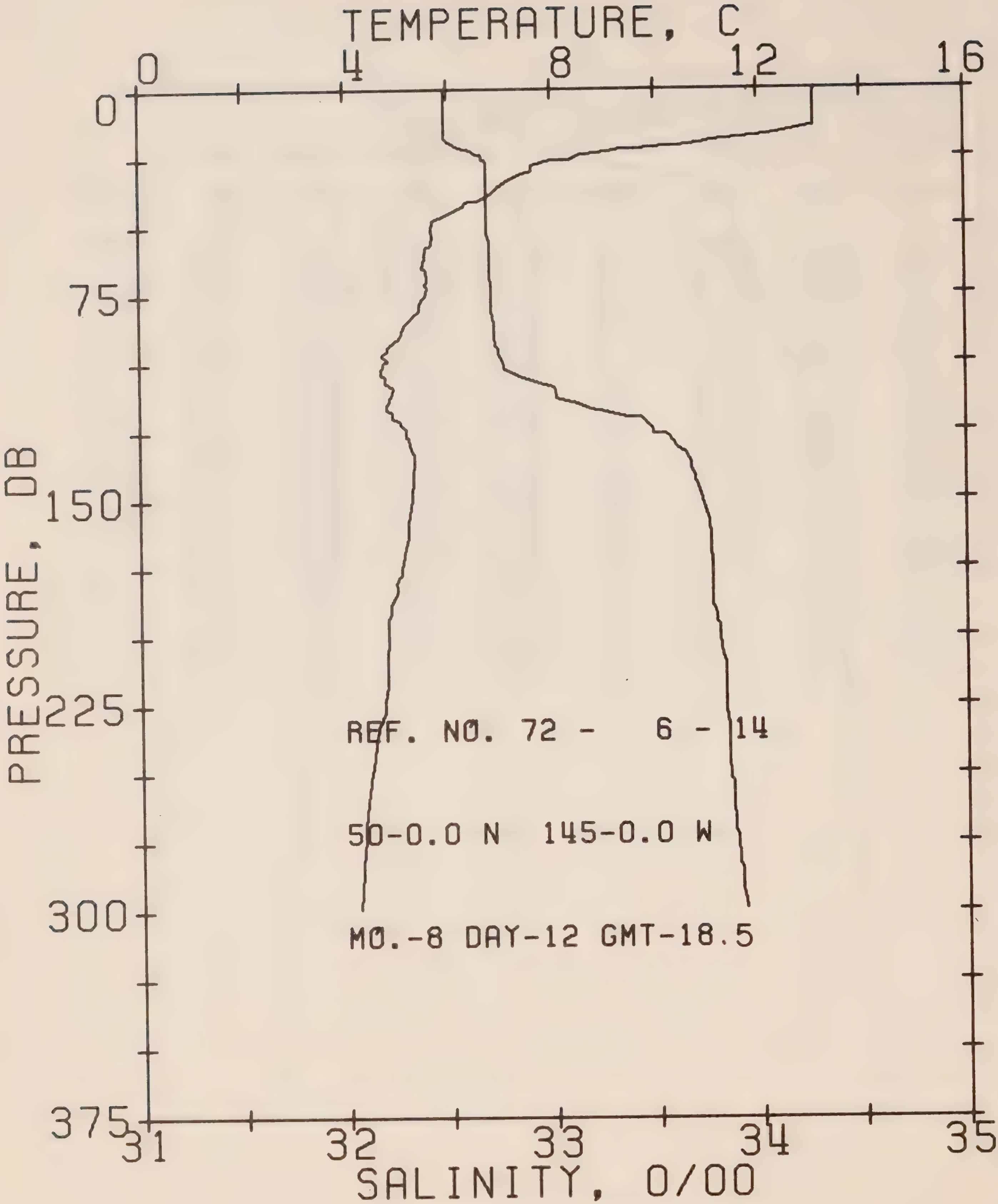
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 6 - 12
50-0.0 N 145-0.0 W
MO.-8 DAY-9 GMT-18.5
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 12 DATE 9/ 8/72
POSITION 50- 0.0N, 145- 0.0W GMT 18.5
RESULTS OF STP CAST 200 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	13.18	32.47	0	24.42	351.6	0.0	0.0	1498.
10	13.19	32.47	10	24.42	352.3	0.35	0.02	1499.
20	11.95	32.55	20	24.72	323.9	0.70	0.07	1495.
30	8.17	32.68	30	25.45	254.3	0.98	0.14	1481.
50	6.22	32.72	50	25.75	226.1	1.45	0.34	1474.
75	5.55	32.72	75	25.83	218.5	2.01	0.69	1471.
100	4.97	32.82	99	25.98	204.6	2.54	1.16	1470.
125	5.00	33.45	124	26.47	158.2	2.99	1.67	1471.
150	4.77	33.70	149	26.69	137.5	3.35	2.18	1471.
175	4.58	33.74	174	26.75	132.5	3.69	2.74	1470.
200	4.37	33.78	199	26.80	127.4	4.01	3.36	1470.
225	4.13	33.81	223	26.85	123.0	4.32	4.03	1469.
250	3.98	33.83	248	26.89	119.8	4.63	4.77	1469.
300	3.75	33.90	298	26.97	112.5	5.21	6.39	1469.
400	3.67	34.05	397	27.09	101.4	6.27	10.17	1471.
500	3.59	34.14	496	27.17	94.5	7.25	14.66	1472.
600	3.47	34.23	595	27.25	87.6	8.16	19.75	1473.
800	3.19	34.31	793	27.34	79.9	9.81	31.53	1476.
1000	2.85	34.39	990	27.44	71.5	11.32	45.33	1478.
1200	2.60	34.46	1188	27.52	64.9	12.70	60.84	1480.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8
12
16
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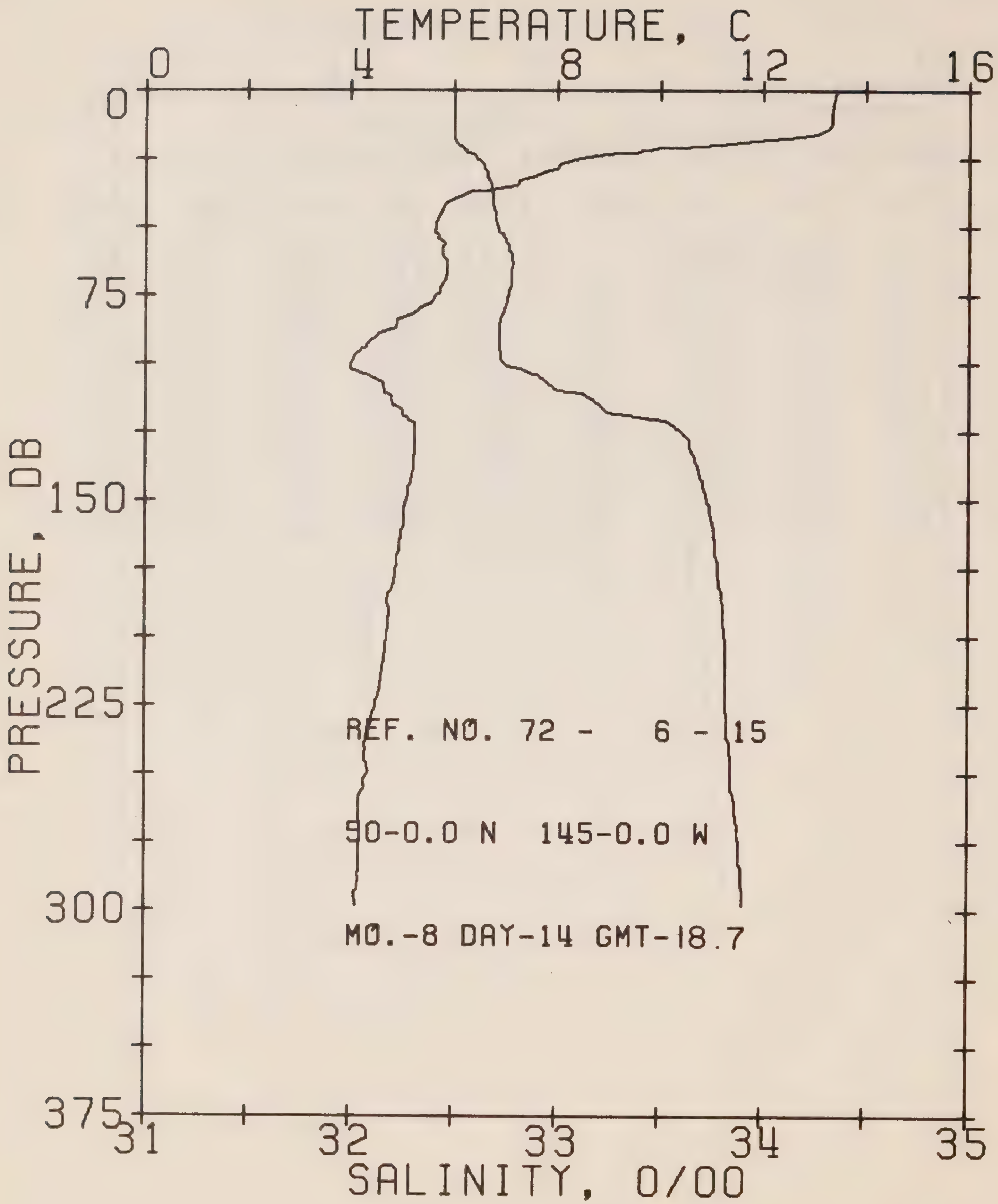
75
150
225
300
375
PRESSURE, DB
REF. NO. 72 - 6 - 14
50-0.0 N 145-0.0 W
MO.-8 DAY-12 GMT-18.5
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 14 DATE 12/ 8/72
POSITION 50- 0.0N, 145- 0.0W GMT 18.5
RESULTS OF STP CAST 129 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	13.11	32.49	0	24.45	348.8	0.0	0.0	1498.
10	13.09	32.49	10	24.46	348.9	0.35	0.02	1498.
20	10.89	32.53	20	24.90	307.1	0.69	0.07	1491.
30	7.63	32.69	30	25.54	246.1	0.95	0.14	1479.
50	5.70	32.69	50	25.79	222.3	1.42	0.32	1472.
75	5.54	32.71	75	25.82	219.2	1.97	0.68	1471
100	4.75	32.76	99	25.95	207.1	2.50	1.15	146[illegible]
125	5.17	33.48	124	26.48	157.6	2.96	1.68	1472.
150	5.27	33.72	149	26.65	141.3	3.33	2.19	1473.
175	5.08	33.77	174	26.72	135.7	3.67	2.76	1473.
200	4.80	33.80	199	26.77	130.7	4.01	3.40	1472.
225	4.71	33.83	223	26.81	127.6	4.33	4.09	1472.
250	4.45	33.85	248	26.85	123.7	4.64	4.85	1471.



TEMPERATURE, C
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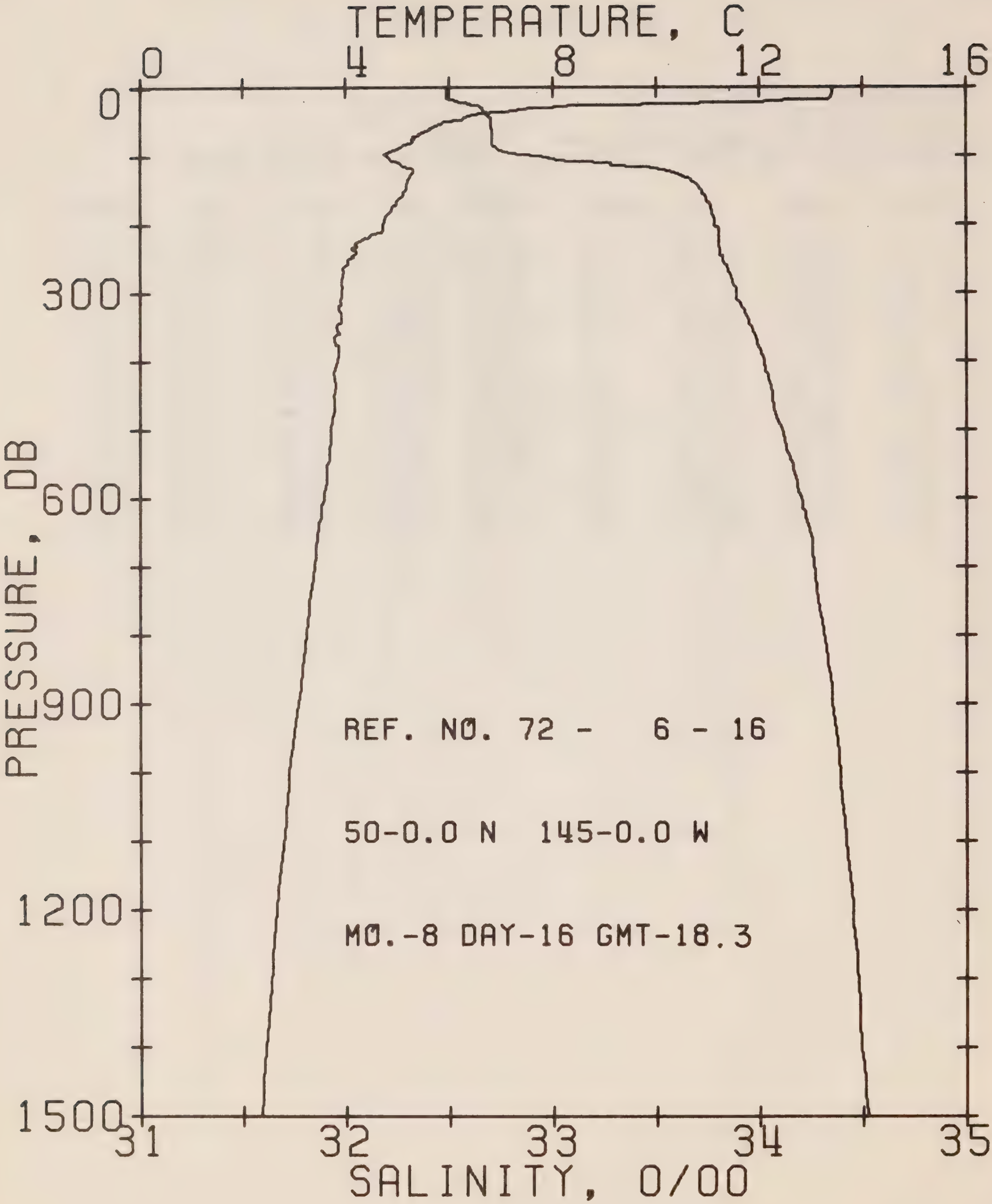
4
8
12
16
0
75
150
225
300
375
PRESSURE, DB
REF. NO. 72 - 6 - 15
50-0.0 N 145-0.0 W
MO.-8 DAY-14 GMT-18.7
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 15 DATE 14/ 8/72
POSITION 50- 0.0N, 145- 0.0W GMT 18.7
RESULTS OF STP CAST 150 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	13.41	32.50	0	24.40	353.7	0.0	0.0	1499.
10	13.33	32.50	10	24.42	352.8	0.35	0.02	1499.
20	11.14	32.52	20	24.85	312.0	0.70	0.07	1492.
30	7.77	32.66	30	25.50	250.2	0.97	0.14	1479.
50	5.65	32.71	50	25.82	219.9	1.43	0.32	1471.
75	5.65	32.77	75	25.86	216.0	1.97	0.67	1472.
100	3.99	32.74	99	26.02	200.9	2.49	1.14	1465.
125	5.25	33.60	124	26.56	149.8	2.94	1.64	1472.
150	5.08	33.73	149	26.68	138.6	3.30	2.15	1472.
175	4.88	33.78	174	26.75	132.7	3.64	2.71	1472.
200	4.72	33.82	199	26.79	128.5	3.96	3.33	1472.
225	4.51	33.82	223	26.82	126.2	4.28	4.02	1471.
250	4.34	33.85	248	26.86	122.3	4.59	4.77	1471.



TEMPERATURE, C
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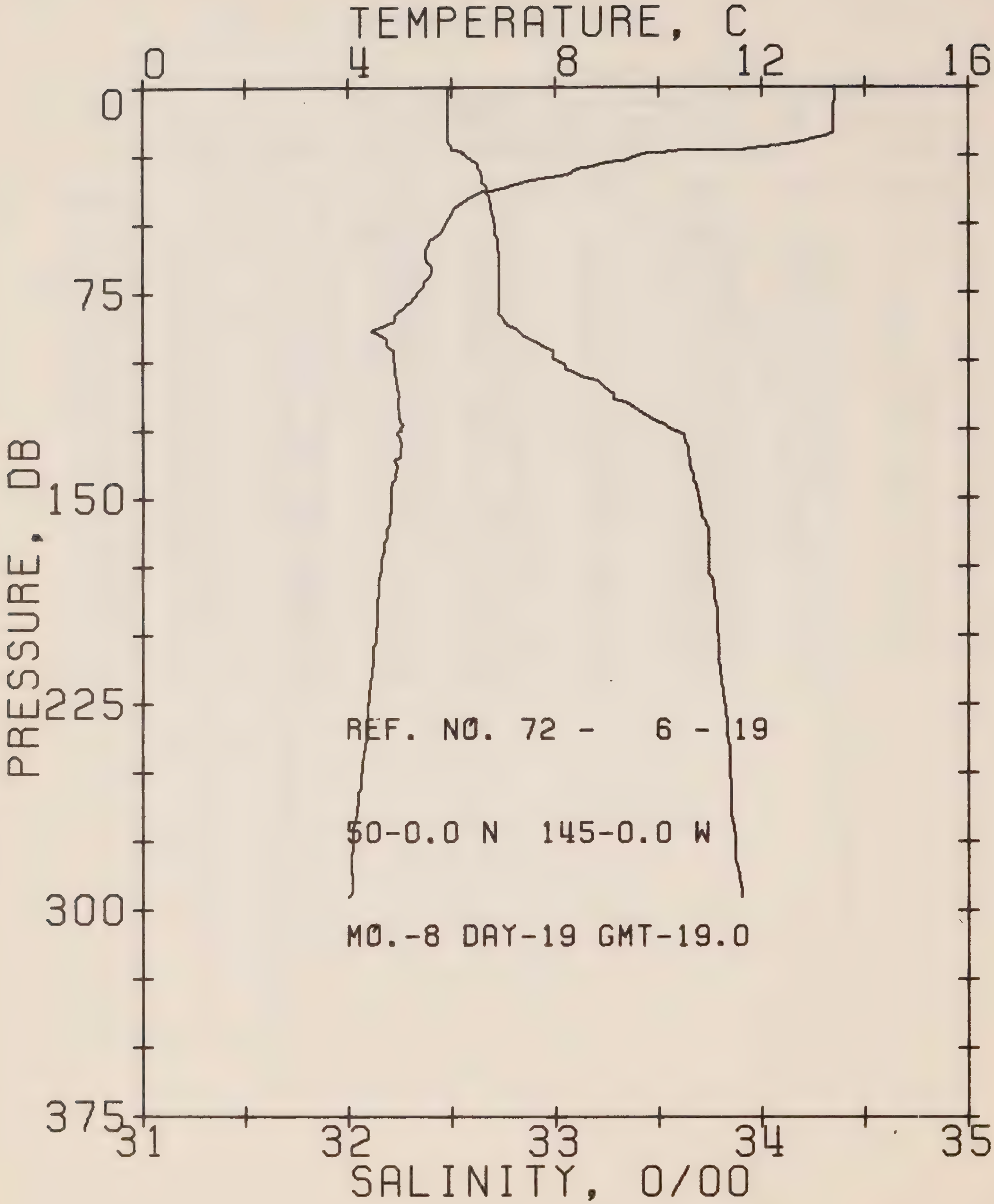
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 6 - 16
50-0.0 N 145-0.0 W
MO.-8 DAY-16 GMT-18.3
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 16 DATE 16/ 8/72
POSITION 50- 0.0N, 145- 0.0W GMT 18.3
RESULTS OF STP CAST 217 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	13.43	32.48	0	24.38	355.6	0.0	0.0	1499.
10	13.40	32.49	10	24.40	354.7	0.35	0.02	1499.
20	12.49	32.52	20	24.60	335.4	0.71	0.07	1496.
30	7.35	32.66	30	25.48	251.3	0.99	0.14	1480.
50	6.06	32.70	50	25.75	225.7	1.46	0.34	1473.
75	5.33	32.71	75	25.85	216.8	2.02	0.69	1471.
100	4.77	32.89	99	26.06	197.2	2.54	1.16	1469.
125	5.30	33.59	124	26.55	151.2	2.97	1.65	1472.
150	5.16	33.71	149	26.66	140.6	3.34	2.15	1472.
175	4.89	33.76	174	26.73	134.4	3.68	2.72	1472.
200	4.71	33.78	199	26.77	131.1	4.01	3.36	1471.
225	4.27	33.80	223	26.83	125.1	4.33	4.05	1470.
250	4.12	33.82	248	26.86	122.3	4.64	4.80	1470.
300	3.92	33.89	298	26.94	115.4	5.23	6.45	1470.
400	3.84	34.02	397	27.05	105.6	6.34	10.38	1471.
500	3.71	34.11	496	27.13	98.6	7.36	15.07	1473.
600	3.57	34.20	595	27.22	91.0	8.31	20.38	1474.
800	3.22	34.31	793	27.34	80.2	10.01	32.49	1476.
1000	2.89	34.39	990	27.43	72.3	11.53	46.42	1478.
1200	2.64	34.45	1188	27.50	66.2	12.92	62.01	1480.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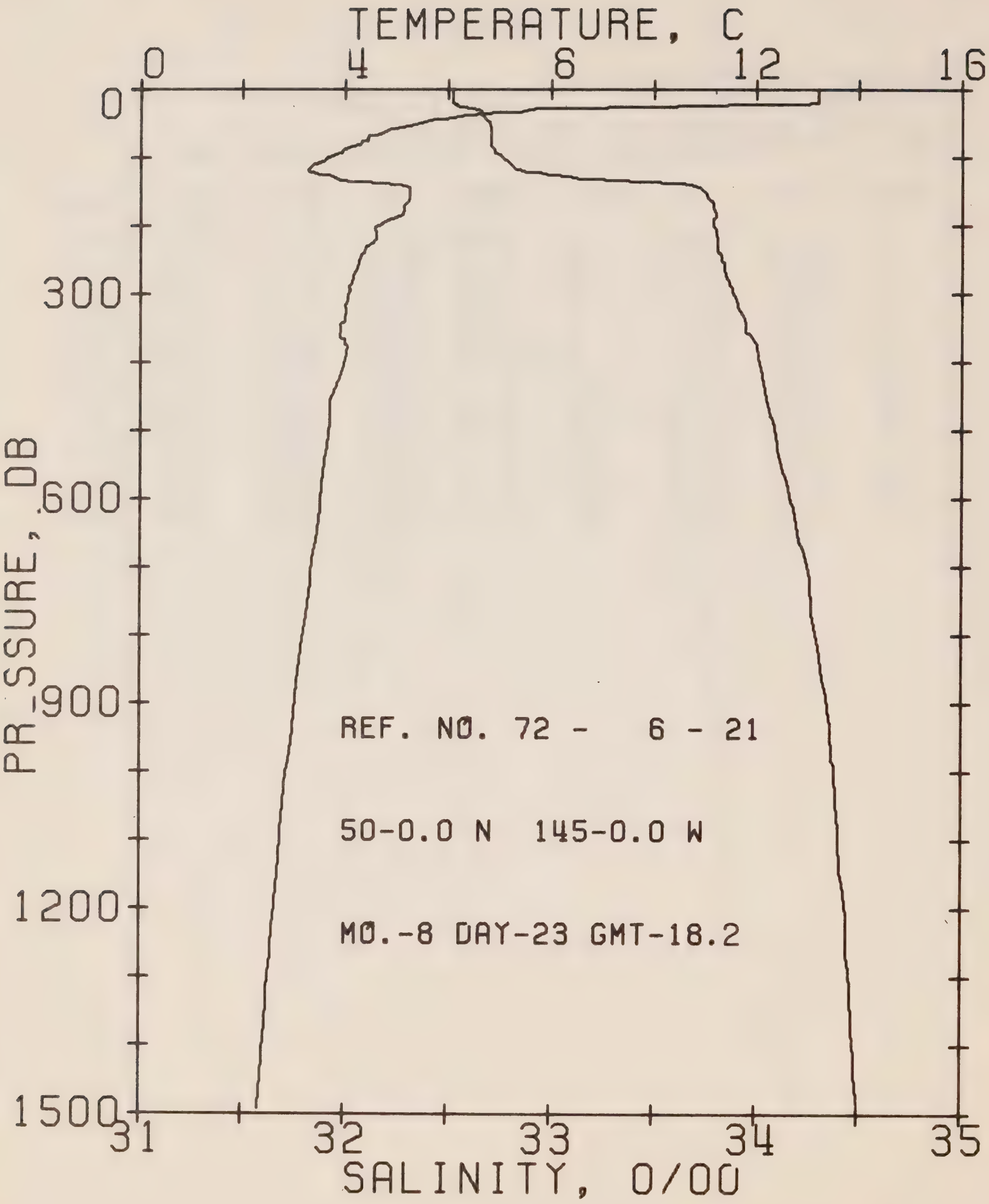
12
16
0
75
150
225
300
375
PRESSURE, DB
REF. NO. 72 - 6 - 19
50-0.0 N 145-0.0 W
MO.-8 DAY-19 GMT-19.0
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 19 DATE 19/ 8/72
POSITION 50- 0.0N, 145- 0.0W GMT 19.0
RESULTS OF STP CAST 141 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	13.40	32.48	0	24.39	355.0	0.0	0.0	1499.
10	13.39	32.48	10	24.39	355.3	0.36	0.02	1499.
20	12.80	32.48	20	24.51	344.4	0.71	0.07	1497.
30	8.41	32.63	30	25.38	261.4	1.00	0.15	1482.
50	5.86	32.71	50	25.78	222.8	1.48	0.34	1472.
75	5.34	32.73	75	25.86	215.4	2.02	0.69	1471.
100	4.89	33.01	99	26.14	189.5	2.53	1.14	1470.
125	5.04	33.56	124	26.55	150.5	2.96	1.62	1471.
150	4.83	33.69	149	26.68	138.5	3.31	2.12	1471.
175	4.64	33.74	174	26.74	133.0	3.65	2.68	1471.
200	4.53	33.78	199	26.79	128.8	3.98	3.30	1471.
225	4.38	33.82	223	26.83	125.0	4.29	3.99	1471.
250	4.25	33.84	248	26.86	122.1	4.60	4.74	1470.



TEMPERATURE, C
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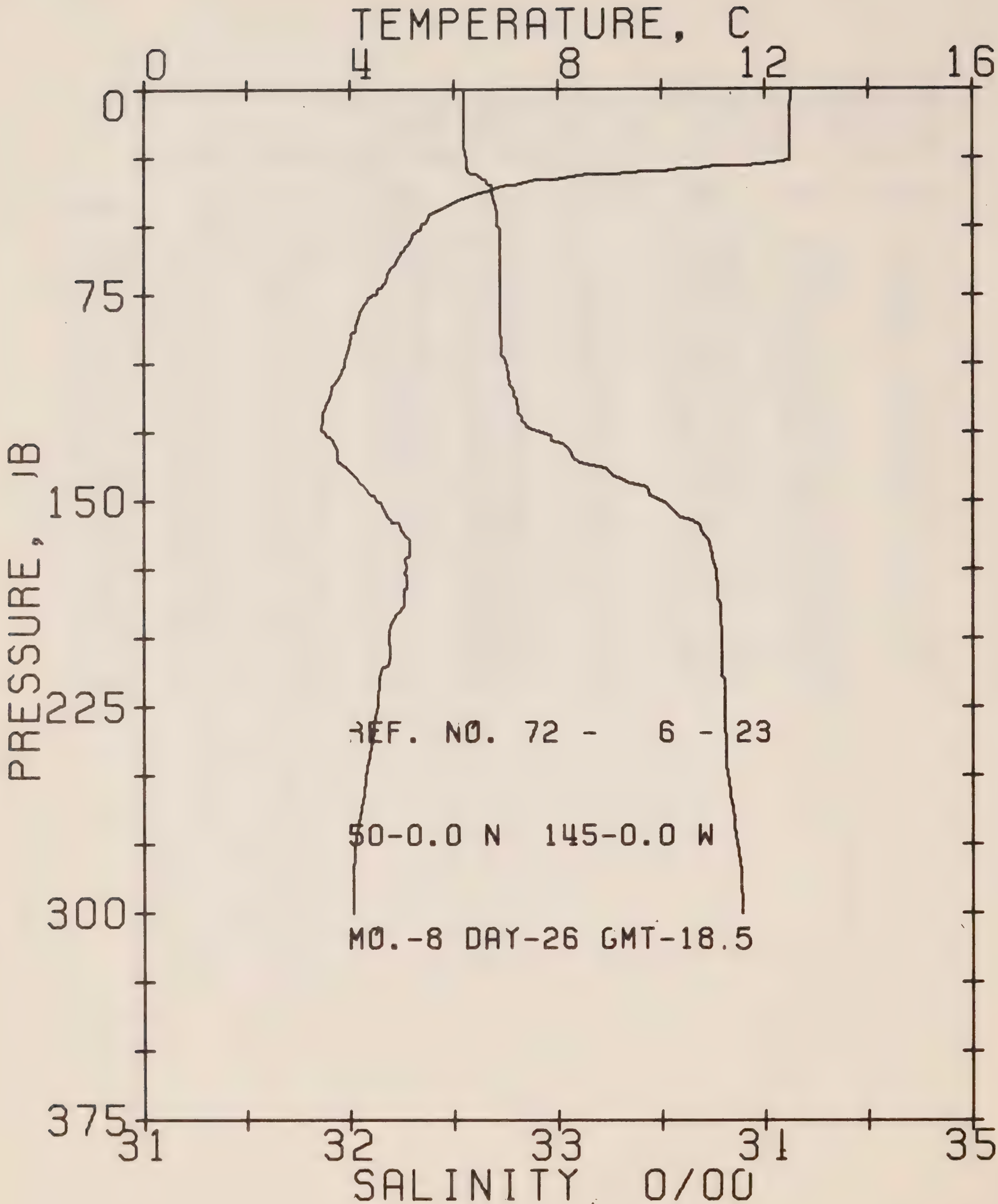
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 6 - 21
50-0.0 N 145-0.0 W
MO.-8 DAY-23 GMT-18.2
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 21 DATE 23/ 8/72
POSITION 50- 0.0N, 145- 0.0W GMT 18.2
RESULTS OF STP CAST 191 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	13.20	32.52	0	24.46	348.3	0.0	0.0	1498.
10	13.20	32.52	10	24.46	348.7	0.35	0.02	1499.
20	13.20	32.52	20	24.46	349.0	0.70	0.07	1499.
30	7.56	32.64	30	25.51	248.9	1.00	0.15	1479.
50	5.51	32.70	50	25.82	219.4	1.46	0.34	1471.
75	4.44	32.71	75	25.95	207.4	1.99	0.67	1467.
100	3.67	32.76	99	26.06	196.4	2.50	1.12	1464.
125	3.54	32.99	124	26.26	178.0	2.97	1.67	1464.
150	5.25	33.74	149	26.67	139.8	3.36	2.20	1473.
175	5.14	33.79	174	26.73	134.9	3.70	2.77	1473.
200	4.68	33.79	199	26.78	130.1	4.03	3.40	1471.
225	4.54	33.81	223	26.81	127.3	4.35	4.10	1471.
250	4.28	33.83	248	26.85	123.2	4.67	4.86	1471.
300	4.07	33.89	298	26.92	117.3	5.27	6.54	1471.
400	4.00	34.01	397	27.03	107.9	6.39	10.52	1472.
500	3.69	34.09	496	27.12	99.8	7.42	15.26	1472.
600	3.52	34.17	595	27.20	92.9	8.39	20.66	1474.
800	3.19	34.29	793	27.32	81.7	10.12	33.00	1476.
1000	2.85	34.38	990	27.43	72.5	11.66	47.06	1478.
1200	2.63	34.43	1188	27.49	67.2	13.06	62.79	1480.



TEMPERATURE, C
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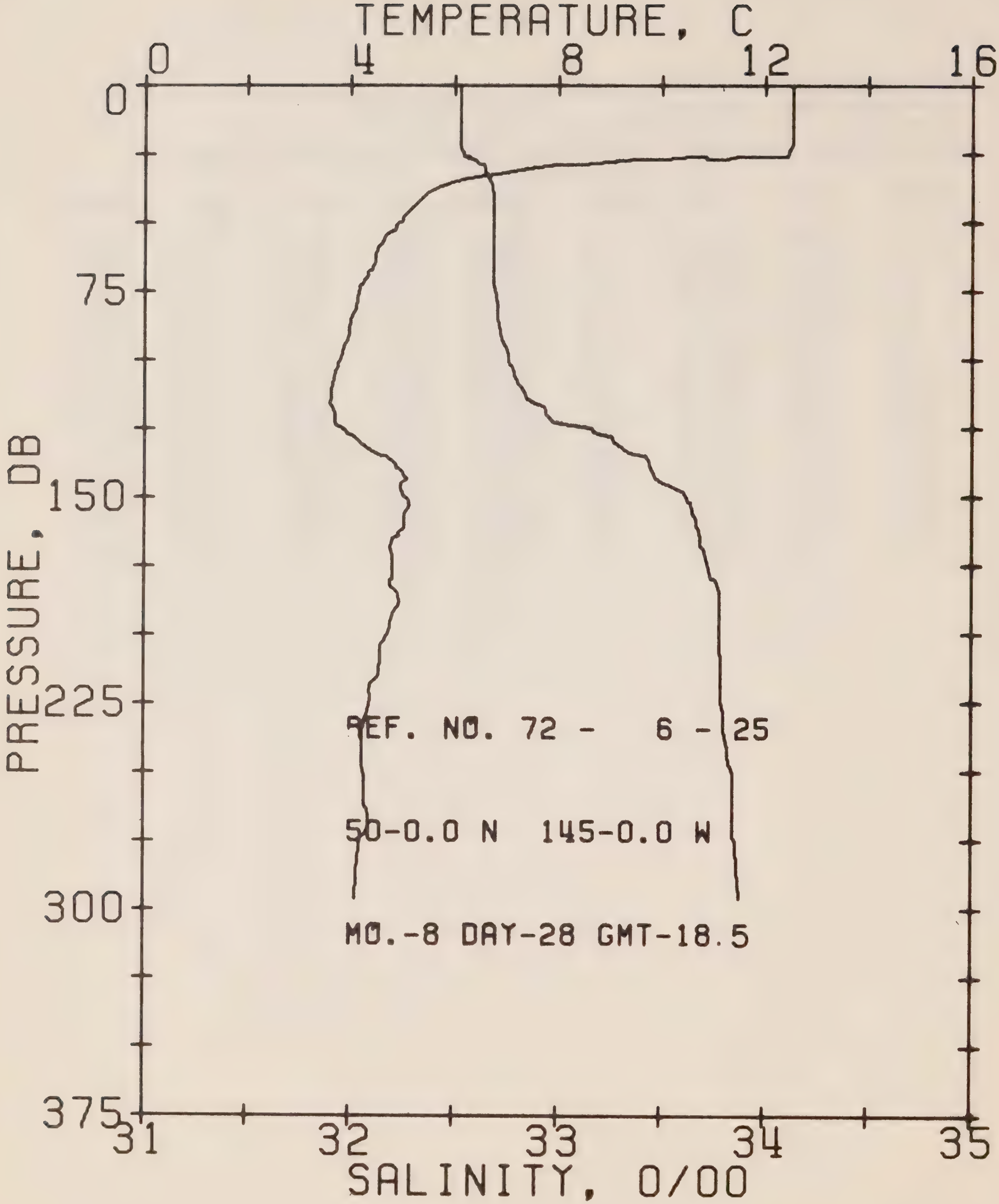
4
8
12
16
0
75
150
225
300
375
PRESSURE, DB
REF. NO. 72 - 6 - 23
50-0.0 N 145-0.0 W
MO.-8 DAY-26 GMT-18.5
31
32
33
34
35
SALINITY 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 23 DATE 26/ 8/72
POSITICN 50- 0.0N, 145- 0.0W GMT 18.5
RESULTS OF STP CAST 139 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	12.50	32.55	0	24.62	333.1	0.0	0.0	1496.
10	12.48	32.55	10	24.62	333.2	0.33	0.02	1496.
20	12.48	32.55	20	24.62	333.4	0.67	0.07	1496.
30	10.02	32.57	30	25.08	290.1	0.99	0.15	1488.
50	5.35	32.71	50	25.85	216.9	1.46	0.34	1470.
75	4.49	32.72	75	25.95	207.2	1.99	0.67	1467.
100	3.89	32.75	99	26.03	199.5	2.49	1.13	1465.
125	3.51	32.92	124	26.21	183.1	2.98	1.68	1464.
150	4.53	33.50	149	26.56	149.6	3.39	2.26	1470.
175	5.07	33.75	174	26.71	136.7	3.75	2.85	1472.
200	4.74	33.79	199	26.77	130.6	4.C8	3.49	1472.
225	4.51	33.80	223	26.80	127.7	4.41	4.19	1471.
250	4.31	33.82	248	26.84	124.4	4.72	4.95	1471.
300	4.05	33.89	298	26.92	116.7	5.32	6.63	1470.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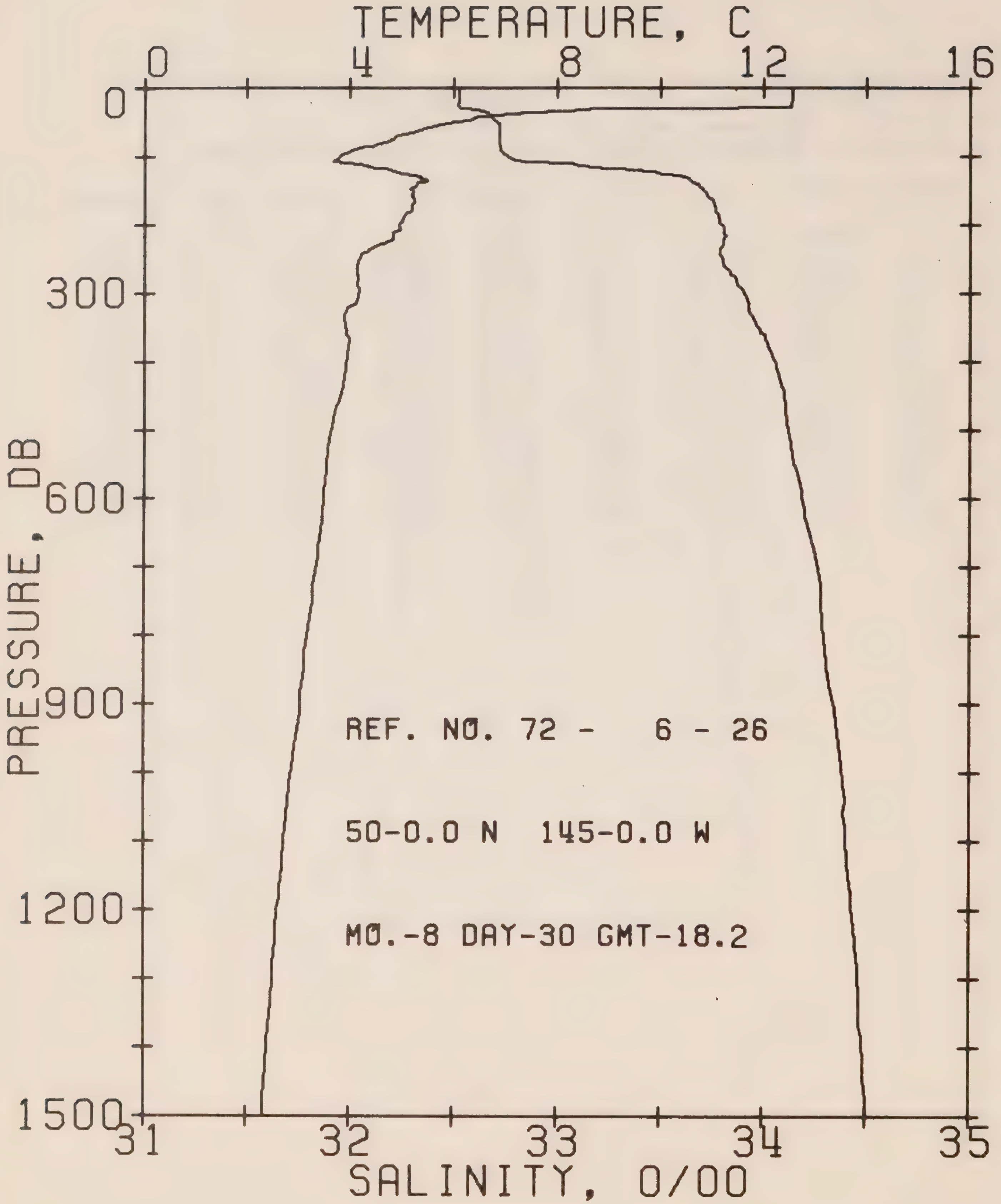
4
8
12
16
0
75
150
225
300
375
PRESSURE, DB
REF. NO. 72 - 6 - 25
50-0.0 N 145-0.0 W
MO.-8 DAY-28 GMT-18.5
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 5- 25 DATE 28/ 8/72
POSITION 50- 0.0N, 145- 0.0W GMT 18.5
RESULTS OF STP CAST 145 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	12.53	32.53	0	24.60	335.1	0.0	0.0	1496.
10	12.53	32.53	10	24.60	335.6	0.34	0.02	1496.
20	12.53	32.53	20	24.60	335.8	0.67	0.07	1497.
30	7.61	32.64	30	25.50	249.5	0.98	0.15	1479.
50	4.94	32.69	50	25.88	213.9	1.43	0.33	1469.
75	4.17	32.69	75	25.96	205.9	1.95	0.66	1466.
100	3.79	32.76	99	26.05	197.5	2.46	1.11	1465.
125	3.85	33.16	124	26.36	168.2	2.93	1.65	1466.
150	5.07	33.61	149	26.59	146.9	3.32	2.20	1472.
175	4.83	33.72	174	26.71	136.4	3.68	2.79	1471.
200	4.73	33.78	199	26.76	131.3	4.01	3.42	1472.
225	4.36	33.79	223	26.81	126.8	4.33	4.12	1470.
250	4.29	33.84	248	26.86	122.1	4.64	4.87	1471.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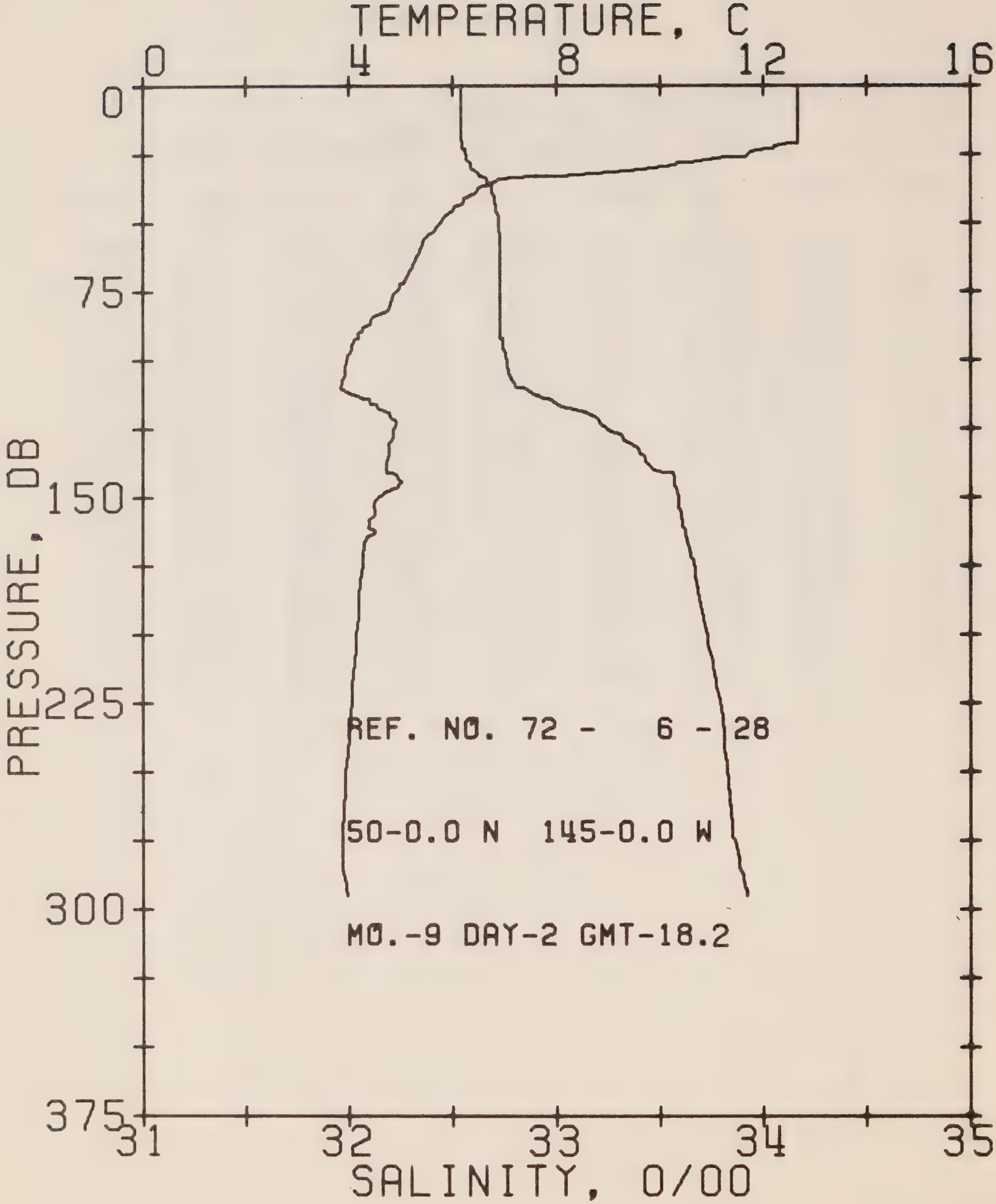
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 6 - 26
50-0.0 N 145-0.0 W
MO.-8 DAY-30 GMT-18.2
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 26 DATE 30/ 8/72
POSITION 50- 0.0N. 145- 0.0W GMT 18.2
RESULTS OF STP CAST 191 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	12.56	32.52	0	24.58	336.4	0.0	0.0	1496.
10	12.55	32.53	10	24.59	335.9	0.34	0.02	1496.
20	12.54	32.53	20	24.59	336.1	0.67	0.07	1497.
30	10.86	32.54	30	24.91	306.1	1.01	0.15	1491.
50	6.04	32.71	50	25.77	224.7	1.49	0.35	1473.
75	4.85	32.72	75	25.91	210.9	2.03	0.69	1469.
100	3.84	32.75	99	26.04	198.4	2.55	1.15	1465.
125	5.02	33.51	124	26.52	154.0	2.99	1.66	1471.
150	5.20	33.71	149	26.65	141.3	3.36	2.17	1473.
175	5.20	33.76	174	26.70	137.4	3.71	2.75	1473.
200	4.97	33.79	199	26.75	132.8	4.05	3.39	1473.
225	4.75	33.81	223	26.79	129.5	4.37	4.10	1472.
250	4.18	33.80	248	26.84	124.7	4.69	4.87	1470.
300	4.18	33.91	298	26.92	116.9	5.29	6.56	1471.
400	3.94	34.05	397	27.06	104.2	6.39	10.47	1472.
500	3.64	34.12	496	27.15	96.9	7.39	15.05	1472.
600	3.49	34.19	595	27.22	90.8	8.33	20.30	1473.
800	3.17	34.29	793	27.33	81.1	10.03	32.43	1475.
1000	2.87	34.38	990	27.43	72.4	11.57	46.48	1478.
1200	2.60	34.43	1188	27.49	67.2	12.97	62.14	1480.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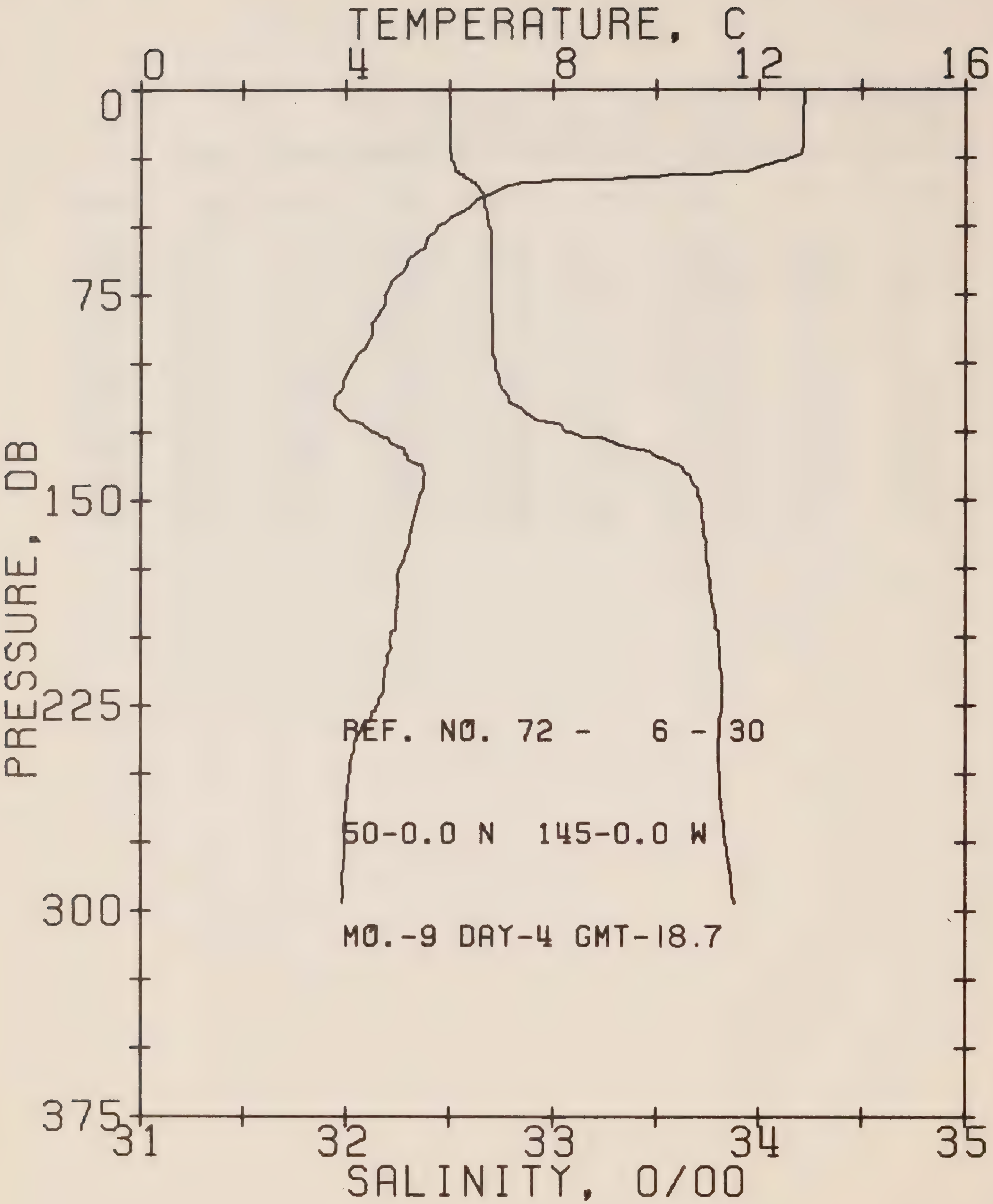
4
8
12
16
0
75
150
225
300
375
PRESSURE, DB
REF. NO. 72 - 6 - 28
50-0.0 N 145-0.0 W
MO.-9 DAY-2 GMT-18.2
31
32
33
34
35
SALINITY, 0/00

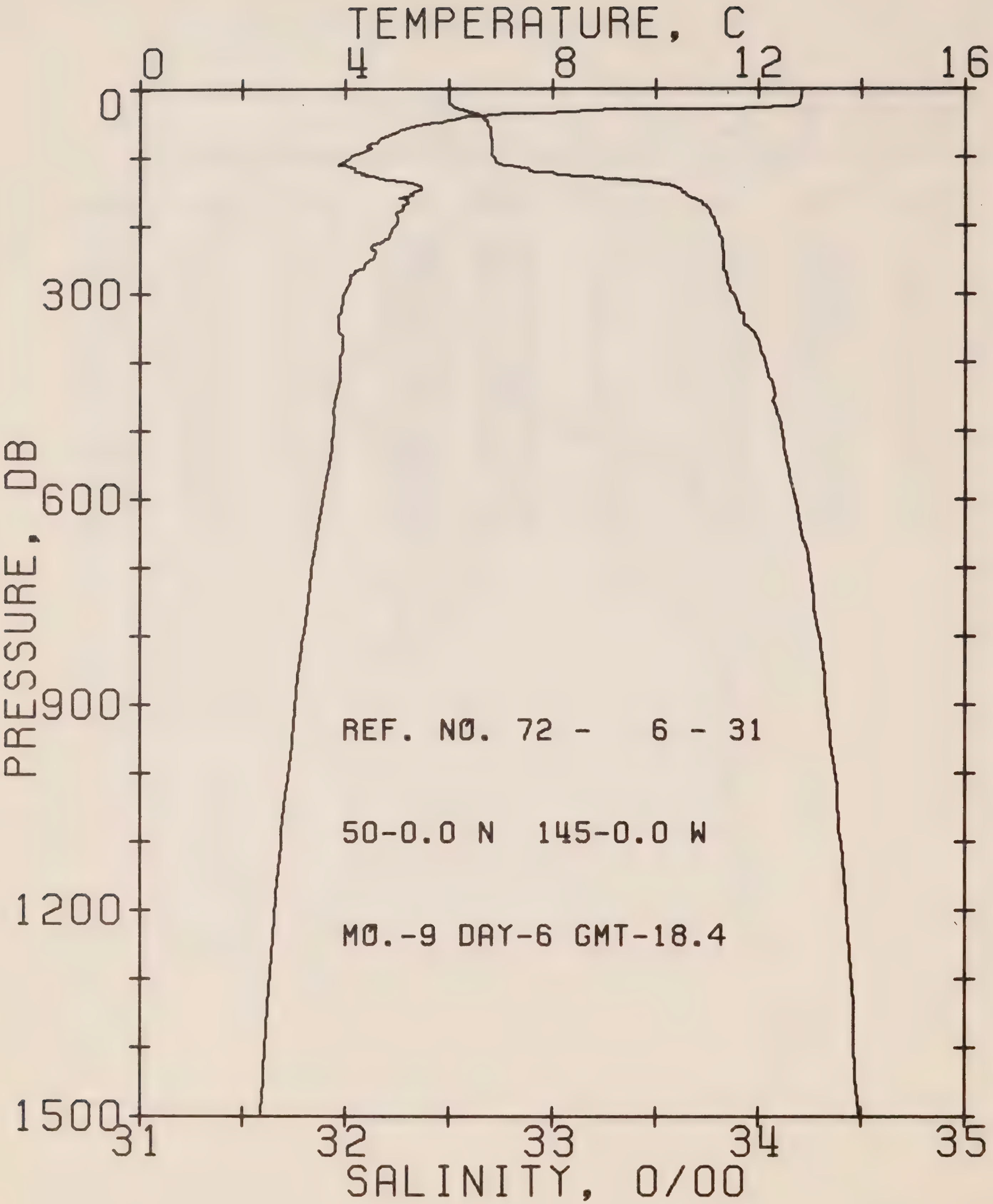
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 28 DATE 2/ 9/72
POSITION 50- 0.0N, 145- 0.0W GMT 18.2
RESULTS OF STP CAST 145 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	12.67	32.54	0	24.58	336.9	0.0	0.0	1497.
10	12.67	32.54	10	24.58	337.4	0.34	0.02	1497.
20	12.67	32.54	20	24.58	337.6	0.67	0.07	1497.
30	9.88	32.59	30	25.12	286.4	0.99	0.15	1487.
50	5.75	32.72	50	25.81	220.5	1.46	0.34	1472.
75	4.90	32.73	75	25.91	210.7	2.00	0.68	1469.
100	3.95	32.75	99	26.03	199.5	2.51	1.14	1465.
125	4.86	33.24	124	26.32	172.5	2.98	1.68	1470.
150	4.57	33.59	149	26.63	143.6	3.37	2.22	1470.
175	4.26	33.66	174	26.72	134.8	3.72	2.80	1469.
200	4.14	33.73	199	26.78	129.1	4.05	3.43	1469.
225	4.03	33.79	223	26.84	123.6	4.37	4.11	1469.
250	3.92	33.82	248	26.88	120.1	4.67	4.85	1469.


TEMPERATURE, C
0
4
8
12
16
PRESSURE, DB
0
75
150
225
300
375
REF. NO. 72 - 6 - 30
50-0.0 N 145-0.0 W
MO.-9 DAY-4 GMT-18.7
31
32
33
34
35
SALINITY, 0/00

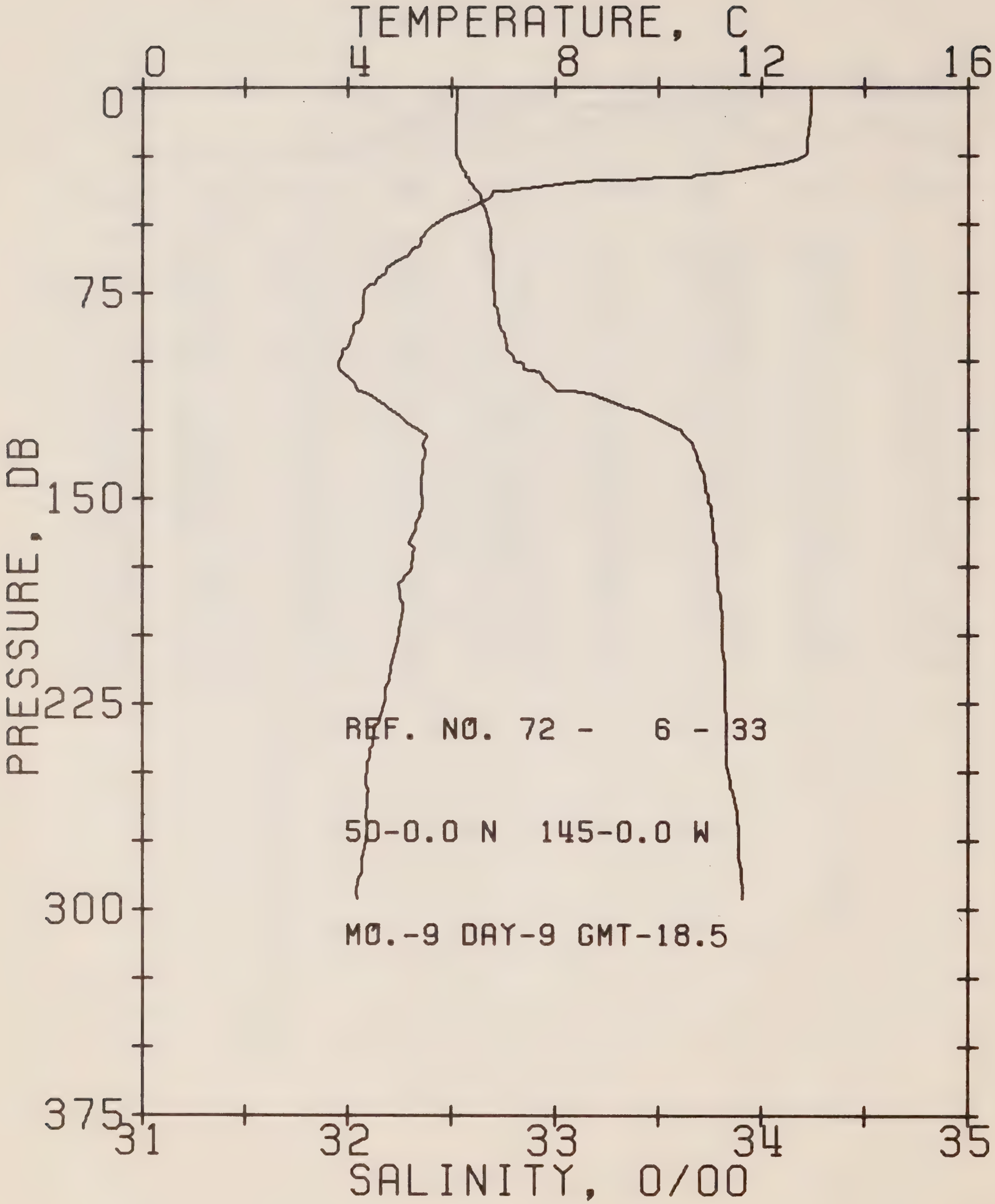
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 30 DATE 4/ 9/72
POSITION 50- 0.0N, 145- 0.0W GMT 18.7
RESULTS OF STP CAST 148 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	12.87	32.50	0	24.51	343.7	0.0	0.0	1497.
10	12.85	32.50	10	24.51	343.7	0.34	0.02	1497.
20	12.84	32.50	20	24.51	343.7	0.69	0.07	1498.
30	11.76	32.53	30	24.74	322.3	1.02	0.16	1494.
50	5.77	32.69	50	25.78	223.1	1.51	0.35	1472.
75	4.74	32.70	75	25.91	211.2	2.05	0.70	1468.
100	4.11	32.72	99	25.99	203.6	2.57	1.16	1466.
125	4.51	33.06	124	26.22	182.3	3.06	1.72	1468.
150	5.39	33.71	149	26.63	143.5	3.45	2.26	1473.
175	5.01	33.75	174	26.71	136.4	3.80	2.84	1472.
200	4.86	33.80	199	26.77	131.2	4.13	3.48	1472.
225	4.59	33.82	223	26.81	127.0	4.46	4.18	1471.
250	4.06	33.81	248	26.86	122.8	4.77	4.93	1470.


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 6 - 31
50-0.0 N 145-0.0 W
MO.-9 DAY-6 GMT-18.4
31
32
33
34
35
SALINITY, 0/00

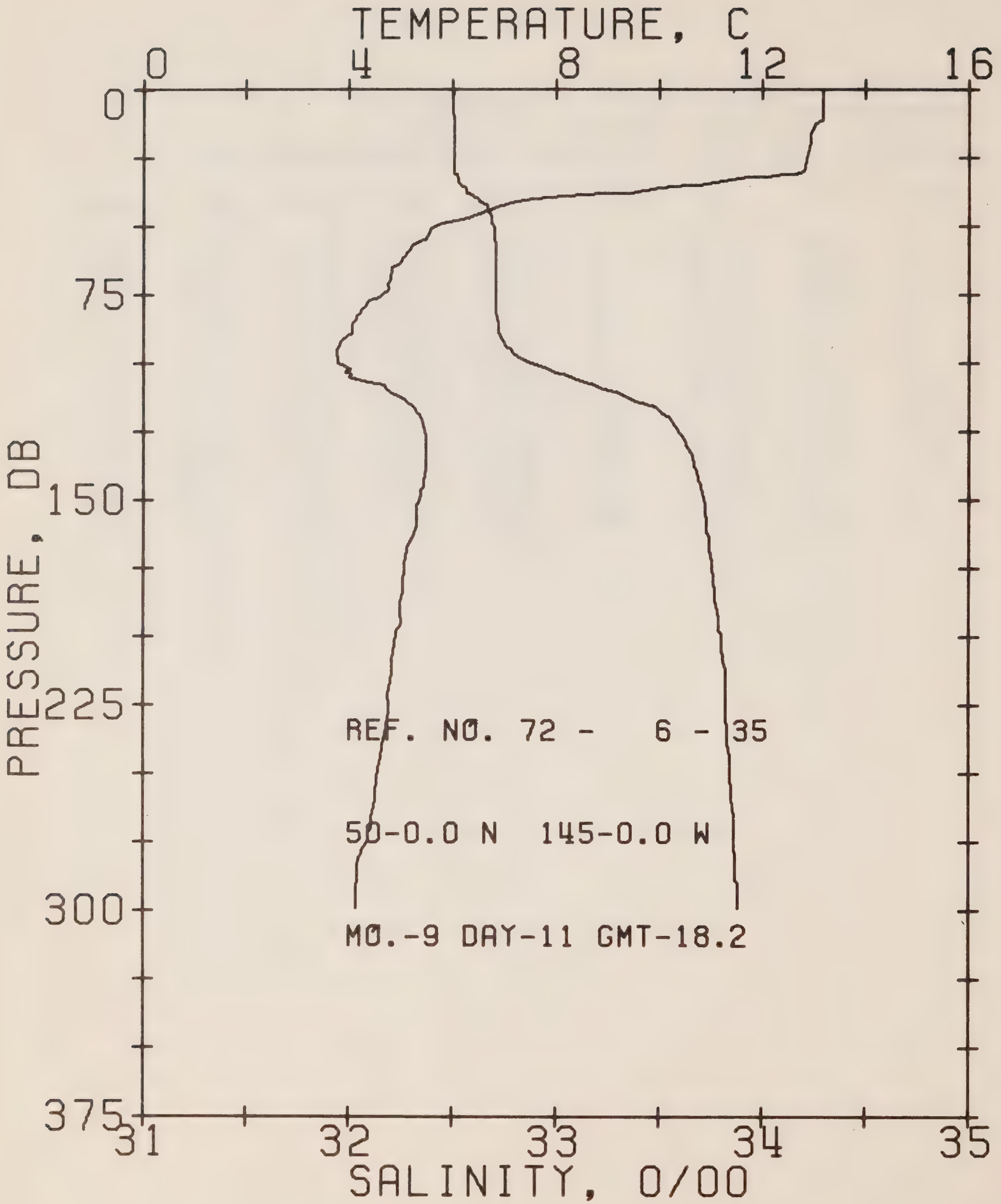
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 31 DATE 6/ 9/72
POSITION 50- 0.0N, 145- 0.0W GMT 18.4
RESULTS OF STP CAST 198 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	12.85	32.49	0	24.50	344.0	0.0	0.0	1497.
10	12.82	32.50	10	24.52	343.1	0.34	0.02	1497.
20	12.81	32.50	20	24.52	343.2	0.69	0.07	1497.
30	11.58	32.55	30	24.79	317.6	1.02	0.16	1493.
50	5.88	32.69	50	25.77	224.4	1.51	0.35	1472.
75	4.66	32.70	75	25.92	210.0	2.05	0.69	1468.
100	4.11	32.71	99	25.98	204.1	2.57	1.16	1466.
125	4.44	33.02	124	26.19	184.5	3.06	1.72	1468.
150	5.38	33.63	149	26.57	149.5	3.46	2.28	1473.
175	5.11	33.75	174	26.70	137.6	3.82	2.87	1473.
200	4.95	33.79	199	26.75	133.0	4.16	3.52	1472.
225	4.65	33.82	223	26.80	127.7	4.48	4.22	1472.
250	4.52	33.83	248	26.83	125.8	4.80	4.99	1472.
300	3.97	33.87	298	26.92	117.3	5.41	6.69	1470.
400	3.90	34.03	397	27.05	105.6	6.51	10.63	1472.
500	3.77	34.11	496	27.13	99.1	7.53	15.31	1473.
600	3.56	34.18	595	27.20	92.5	8.49	20.68	1474.
800	3.18	34.29	793	27.33	81.1	10.22	32.96	1476.
1000	2.89	34.37	990	27.42	73.6	11.77	47.15	1478.
1200	2.62	34.42	1188	27.48	67.9	13.18	62.97	1480.


TEMPERATURE, C
0
4
8
12
16
0
75
150
225
300
375
PRESSURE, DB
REF. NO. 72 - 6 - 33
50-0.0 N 145-0.0 W
MO.-9 DAY-9 GMT-18.5
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 33   DATE 9/ 9/72
POSITION 50- 0.0N. 145- 0.0W   GMT 18.5
RESULTS OF STP CAST   134 POINTS TAKEN FROM ANALOG TRACE

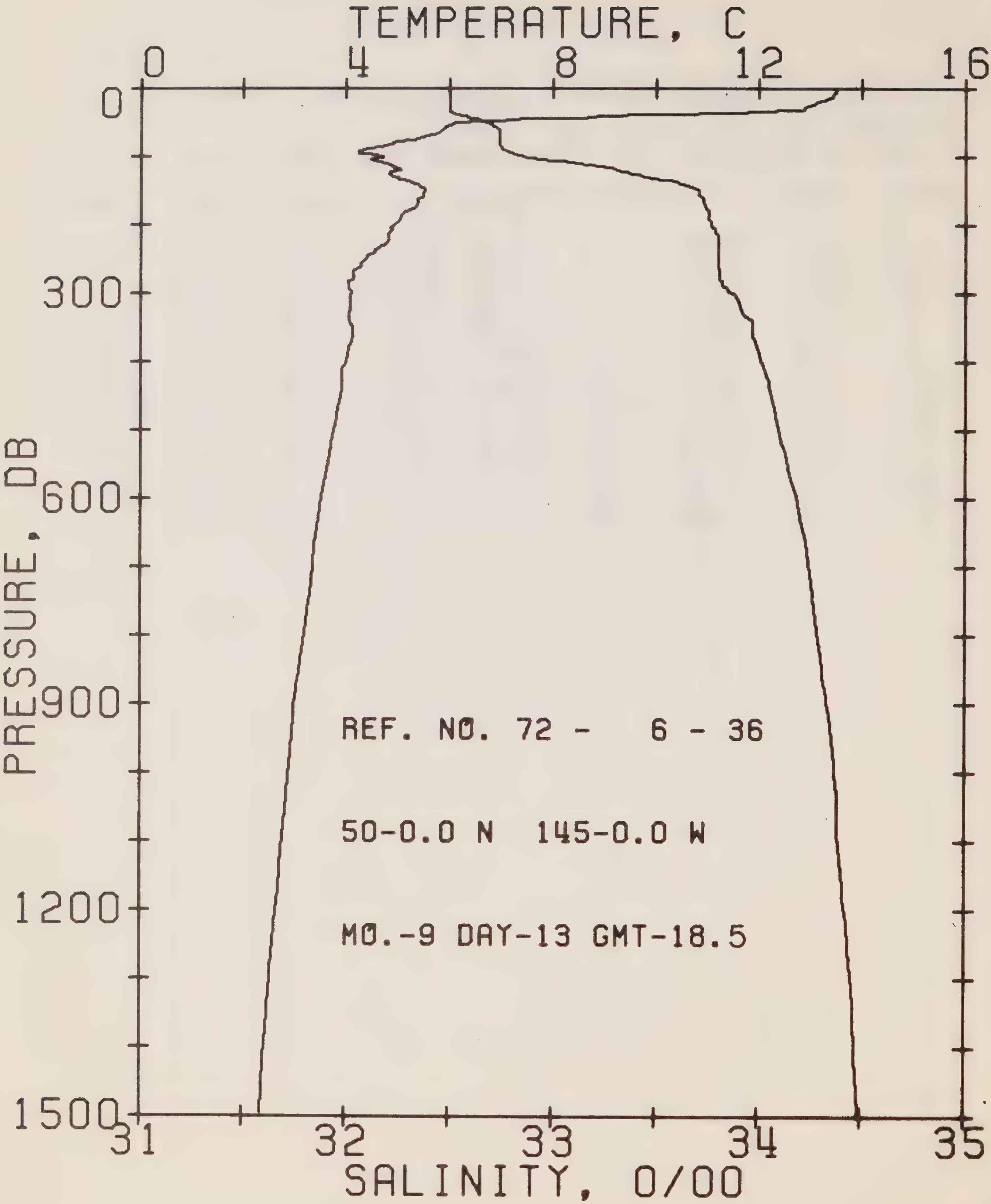
PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	12.97	32.52	0	24.50	344.0	0.0	0.0	1498.
10	12.94	32.52	10	24.51	343.7	0.34	0.02	1498.
20	12.89	32.52	20	24.52	343.2	0.69	0.07	1498.
30	11.68	32.55	30	24.77	319.4	1.02	0.16	1494.
50	5.69	32.68	50	25.78	223.1	1.53	0.36	1472.
75	4.30	32.70	75	25.96	206.4	2.06	0.70	1466.
100	3.82	32.80	99	26.08	194.8	2.57	1.15	1465.
125	5.37	33.60	124	26.55	151.2	3.00	1.64	1473.
150	5.44	33.74	149	26.65	141.8	3.36	2.15	1474.
175	5.23	33.78	174	26.71	136.6	3.71	2.72	1473.
200	4.98	33.81	199	26.76	131.8	4.04	3.36	1473.
225	4.70	33.82	223	26.80	128.2	4.37	4.06	1472.
250	4.36	33.83	248	26.85	123.7	4.68	4.82	1471.



TEMPERATURE, C
0
4
8
12
16
PRESSURE, DB
0
75
150
225
300
375
REF. NO. 72 - 6 - 35
50-0.0 N 145-0.0 W
MO.-9 DAY-11 GMT-18.2
31
32
33
34
35
SALINITY, 0/00

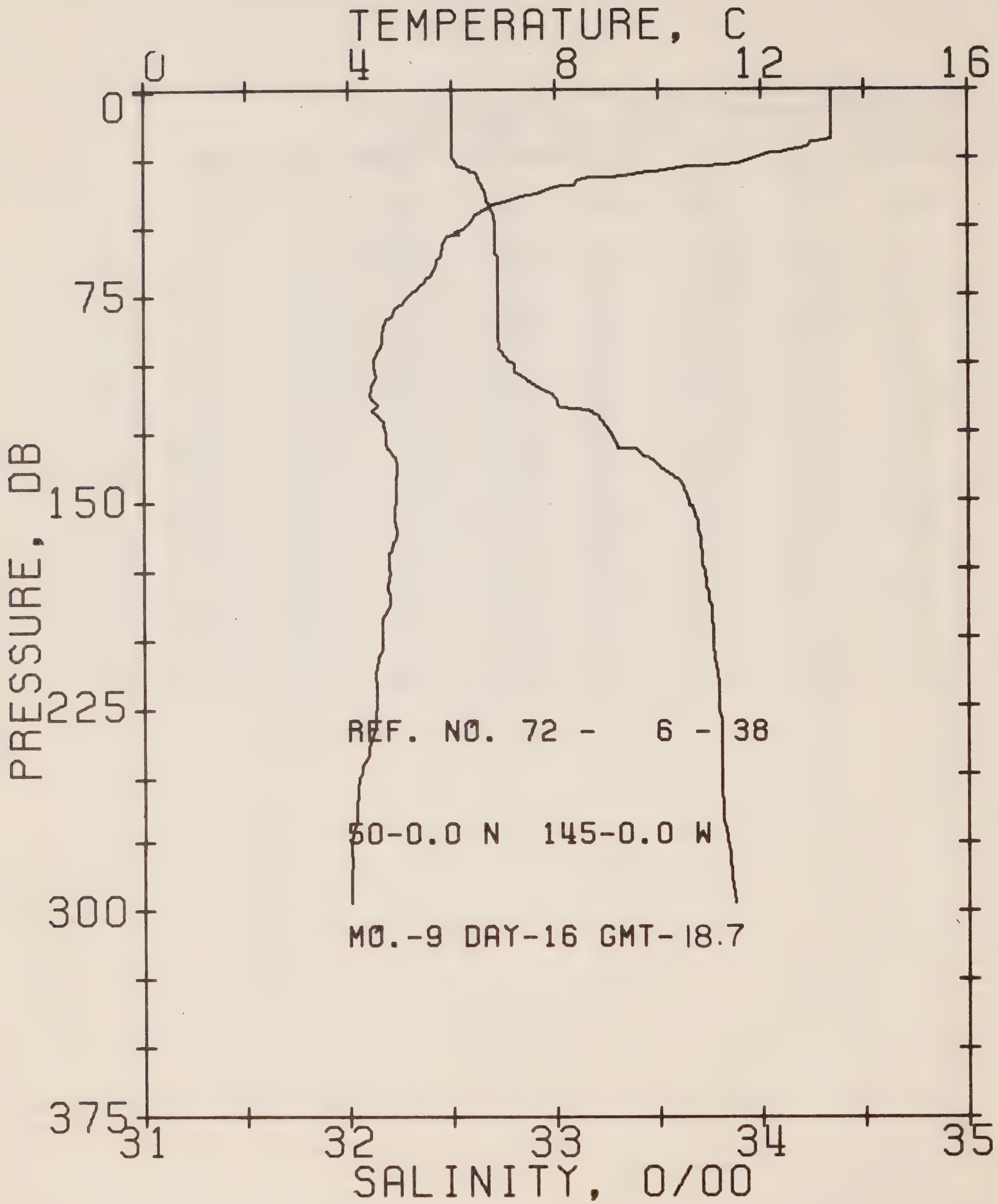
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 35   DATE 11/ 9/72
POSITION 50- 0.0N, 145- 0.0W   GMT 18.2
RESULTS OF STP CAST   129 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	13.17	32.51	0	24.46	348.5	0.0	0.0	1498.
10	13.16	32.50	10	24.45	349.2	0.35	0.02	1498.
20	12.91	32.51	20	24.51	344.2	0.69	0.07	1498.
30	12.80	32.51	30	24.53	342.5	1.04	0.16	1498.
50	5.67	32.69	50	25.80	221.6	1.57	0.37	1472.
75	4.64	32.71	75	25.93	209.5	2.11	0.71	1468.
100	3.79	32.88	99	26.15	188.5	2.61	1.16	1465.
125	5.47	33.59	124	26.53	153.0	3.03	1.64	1473.
150	5.35	33.71	149	26.64	142.6	3.40	2.15	1473.
175	5.05	33.75	174	26.71	136.7	3.75	2.73	1472.
200	4.90	33.80	199	26.76	131.7	4.08	3.37	1472.
225	4.78	33.82	223	26.79	129.1	4.41	4.08	1472.
250	4.54	33.84	248	26.83	125.2	4.73	4.85	1472.


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 6 - 36
50-0.0 N 145-0.0 W
MO.-9 DAY-13 GMT-18.5
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 36   DATE 13/ 9/72
POSITION 50- 0.0N, 145- 0.0W   GMT 18.5
RESULTS OF STP CAST   195 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	13.48	32.49	0	24.38	355.8	0.0	0.0	1499.
10	13.44	32.50	10	24.39	354.8	0.36	0.02	1499.
20	13.11	32.50	20	24.46	348.8	0.71	0.07	1498.
30	12.88	32.50	30	24.51	344.8	1.06	0.16	1498.
50	6.39	32.67	50	25.69	231.6	1.63	0.39	1474.
75	5.30	32.74	75	25.88	214.3	2.18	0.74	1470.
100	4.63	32.85	99	26.04	198.7	2.70	1.20	1468.
125	4.83	33.39	124	26.44	160.9	3.14	1.71	1470.
150	5.51	33.70	149	26.61	145.4	3.52	2.24	1474.
175	5.30	33.74	174	26.67	140.4	3.88	2.83	1473.
200	4.93	33.77	199	26.73	134.3	4.22	3.48	1472.
225	4.78	33.80	223	26.77	130.6	4.55	4.20	1472.
250	4.36	33.80	248	26.82	126.3	4.87	4.98	1471.
300	4.08	33.87	298	26.90	118.6	5.49	6.70	1471.
400	4.00	34.01	397	27.02	108.1	6.62	10.71	1472.
500	3.76	34.10	496	27.12	99.9	7.65	15.45	1473.
600	3.51	34.18	595	27.21	91.7	8.61	20.81	1474.
800	3.19	34.28	793	27.32	82.1	10.34	33.11	1476.
1000	2.89	34.37	990	27.42	73.7	11.88	47.27	1478.
1200	2.65	34.42	1188	27.48	68.7	13.31	63.29	1480.


TEMPERATURE, C
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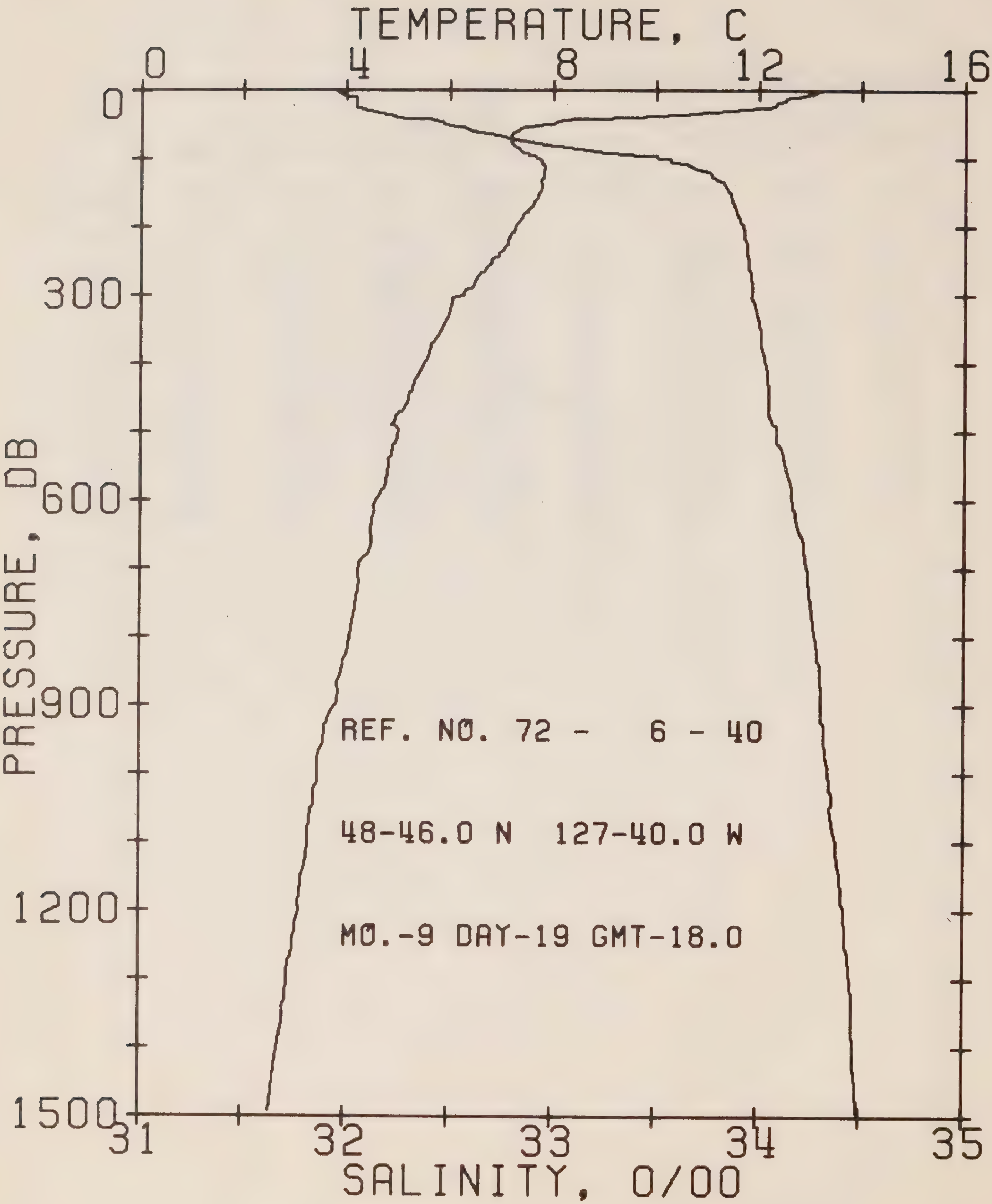
4
8
12
16
PRESSURE, DB
0
75
150
225
300
375
REF. NO. 72 - 6 - 38
50-0.0 N 145-0.0 W
MO.-9 DAY-16 GMT-18.7
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 38   DATE 16/ 9/72
POSITION 50- 0.0N, 145- 0.0W   GMT 18.7
RESULTS OF STP CAST   142 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	13.37	32.50	0	24.41	353.0	0.0	0.0	1499.
10	13.35	32.50	10	24.41	353.1	0.35	0.02	1499.
20	12.92	32.50	20	24.50	345.2	0.71	0.07	1498.
30	9.95	32.59	30	25.10	287.6	1.03	0.15	1488.
50	6.27	32.71	50	25.74	227.5	1.52	0.35	1474.
75	5.17	32.72	75	25.88	214.4	2.07	0.70	1470.
100	4.48	32.80	99	26.01	201.2	2.59	1.17	1468.
125	4.73	33.26	124	26.35	169.5	3.06	1.70	1470.
150	4.91	33.64	149	26.63	143.3	3.44	2.24	1471.
175	4.78	33.71	174	26.71	136.5	3.79	2.82	1471.
200	4.64	33.76	199	26.76	131.8	4.13	3.46	1471.
225	4.53	33.79	223	26.79	128.6	4.45	4.16	1471.
250	4.21	33.80	248	26.84	124.7	4.77	4.93	1470.


TEMPERATURE, C
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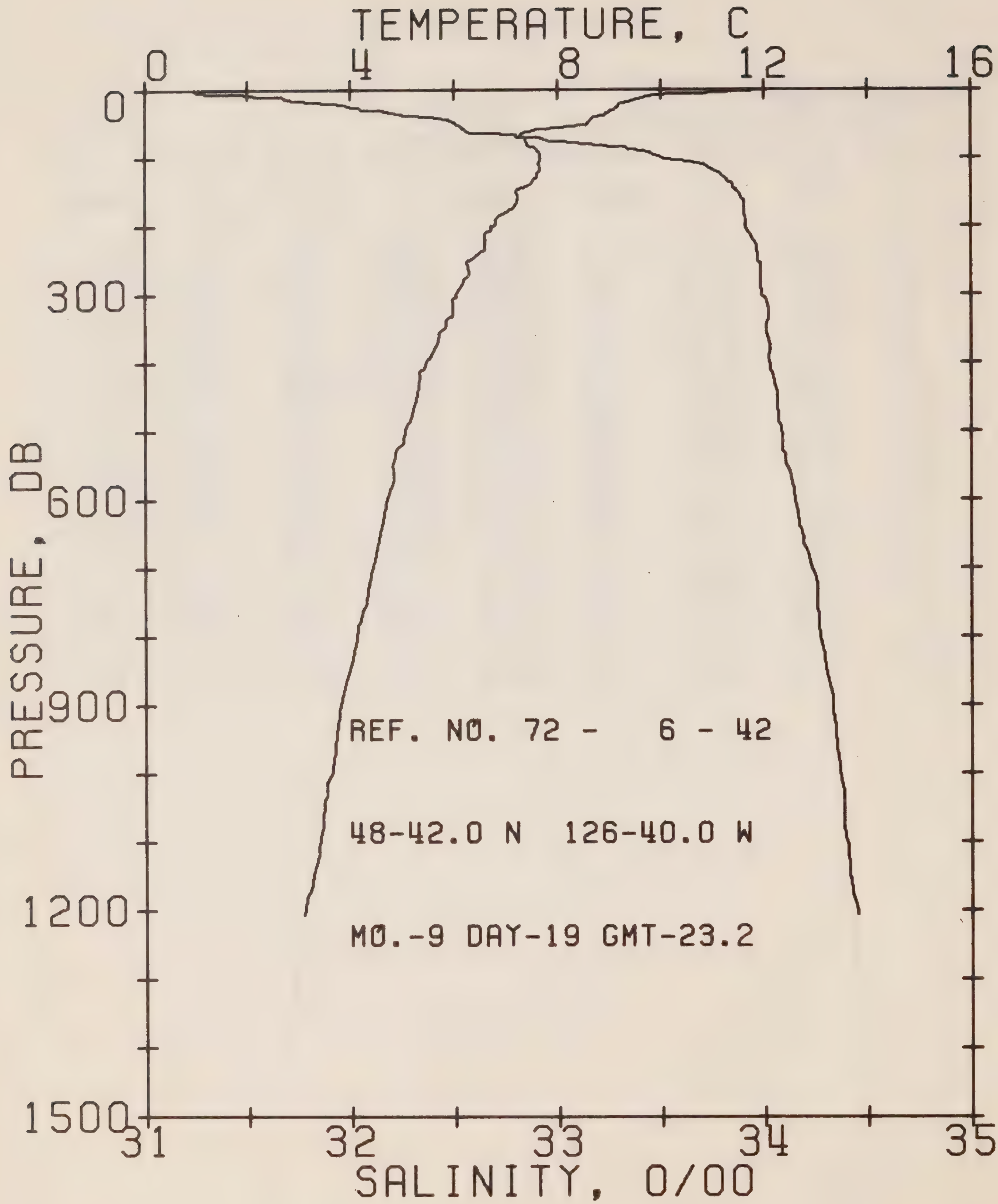
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 6 - 40
48-46.0 N 127-40.0 W
MO.-9 DAY-19 GMT-18.0
31
32
33
34
35
SALINITY, 0/00

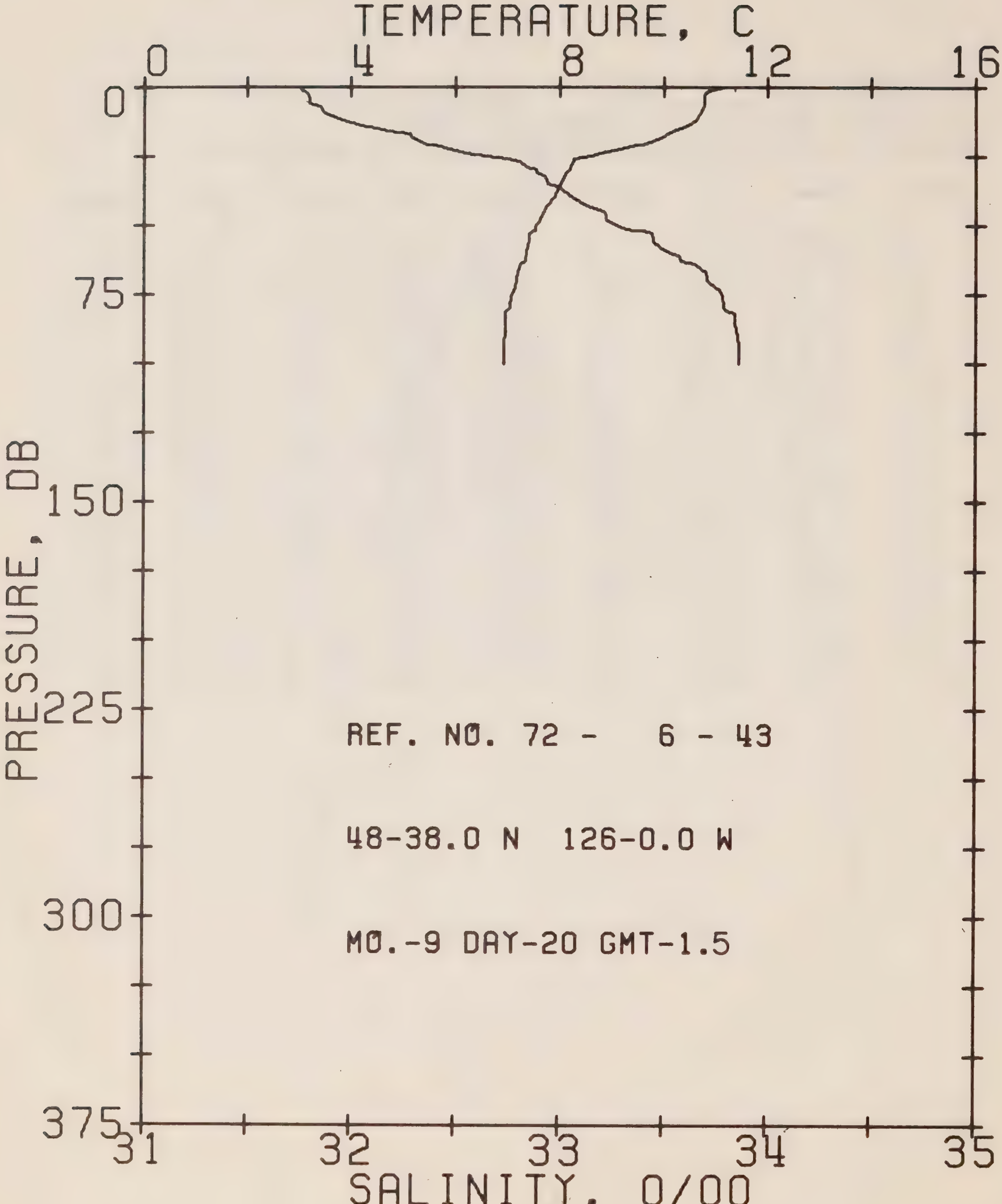
OFFSHORE OCEANOGRAPHY GRCUP
REFERENCE NO. 72- 6- 40 DATE 19/ 9/72
POSITION 48-46.0N, 127-40.0W GMT 18.0
RESULTS OF STP CAST 226 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	13.20	31.96	0	24.03	389.5	0.0	0.0	1498.
10	12.75	32.00	10	24.14	378.6	0.39	0.02	1496.
20	12.33	32.05	20	24.26	367.6	0.76	0.08	1495.
30	11.53	32.10	30	24.45	349.9	1.12	0.17	1493.
50	7.99	32.47	50	25.32	267.7	1.73	0.41	1480.
75	7.17	32.90	75	25.77	224.9	2.34	0.80	1478.
100	7.67	33.51	99	26.18	186.7	2.86	1.26	1481.
125	7.82	33.76	124	26.35	170.2	3.30	1.77	1483.
150	7.72	33.85	149	26.44	162.6	3.72	2.35	1483.
175	7.51	33.88	174	26.49	157.7	4.12	3.01	1482.
200	7.26	33.92	199	26.56	152.2	4.50	3.75	1482.
225	7.11	33.94	223	26.59	149.0	4.88	4.57	1482.
250	6.80	33.95	248	26.64	144.4	5.25	5.46	1481.
300	6.26	33.97	298	26.73	136.6	5.95	7.43	1480.
400	5.51	34.03	397	26.87	123.7	7.24	12.03	1478.
500	5.00	34.09	496	26.98	114.3	8.43	17.47	1478.
600	4.59	34.16	595	27.08	105.0	9.53	23.62	1478.
800	4.08	34.28	793	27.23	92.5	11.49	37.58	1479.
1000	3.46	34.34	991	27.34	82.2	13.23	53.52	1480.
1200	3.11	34.42	1188	27.44	73.6	14.79	70.98	1482.


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 72 - 6 - 42
48-42.0 N 126-40.0 W
MO.-9 DAY-19 GMT-23.2
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 42 DATE 19/ 9/72
POSITION 48-42.0N, 125-40.0W GMT 23.2
RESULTS OF STP CAST 220 POINTS TAKEN FROM ANALOG TRACE

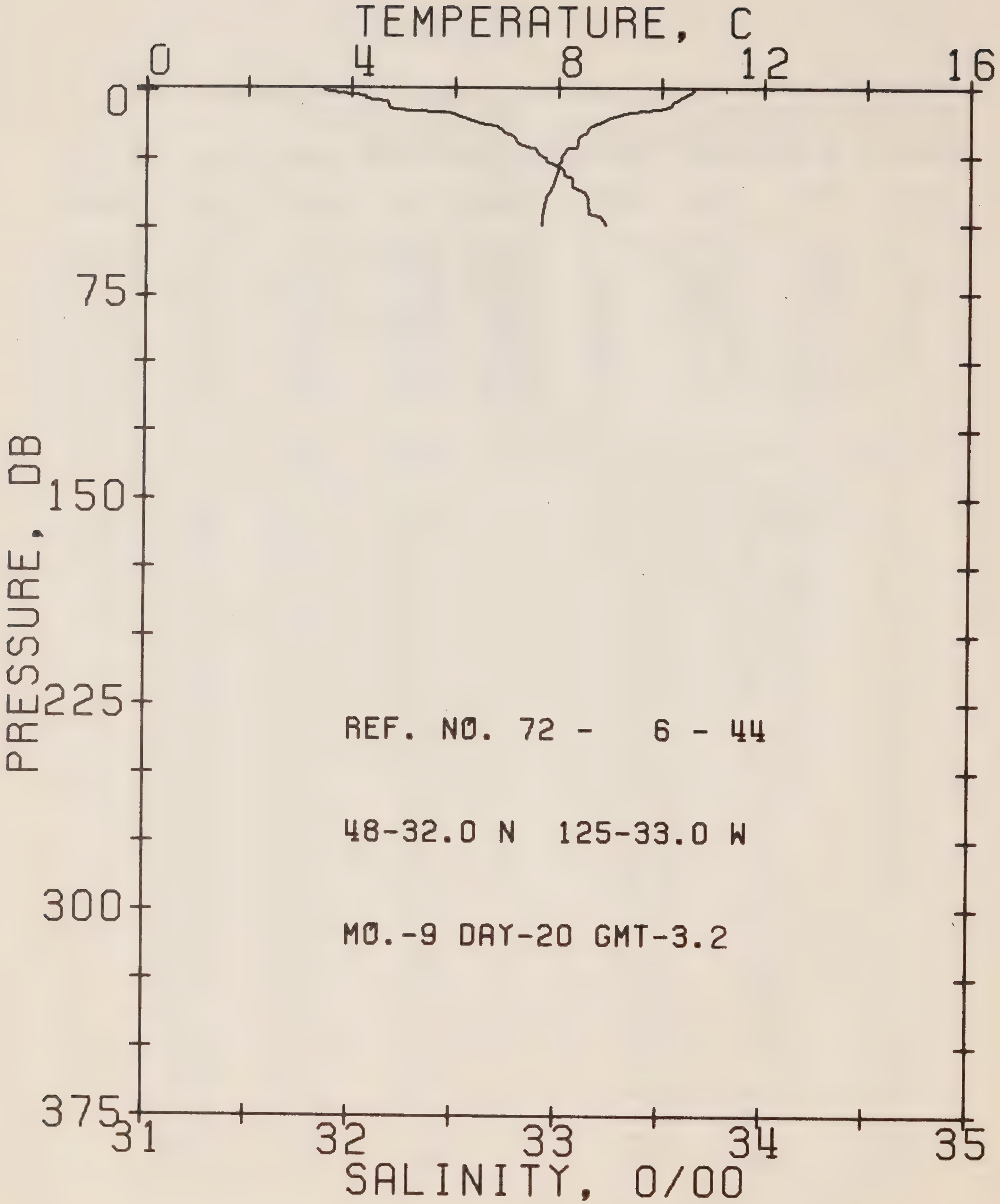
PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	11.97	31.24	0	23.70	420.2	0.0	0.0	1493.
10	9.72	31.56	10	24.34	359.9	0.39	0.02	1485.
20	9.24	31.90	20	24.68	327.6	0.74	0.07	1484.
30	9.10	32.06	30	24.83	313.8	1.06	0.15	1484.
50	8.58	32.51	50	25.26	273.0	1.63	0.39	1483.
75	7.38	32.96	75	25.79	223.3	2.26	0.78	1479.
100	7.66	33.50	99	26.17	187.3	2.76	1.23	1481.
125	7.59	33.79	124	26.41	164.8	3.19	1.72	1482.
150	7.21	33.87	149	26.52	154.4	3.59	2.28	1481.
175	7.09	33.90	174	26.56	150.9	3.97	2.91	1481.
200	6.75	33.91	199	26.62	146.0	4.34	3.62	1480.
225	6.59	33.95	223	26.67	141.0	4.70	4.40	1480.
250	6.31	33.97	248	26.72	136.5	5.05	5.24	1479.
300	6.03	33.99	298	26.77	132.2	5.72	7.13	1479.
400	5.45	34.02	397	26.87	123.7	7.00	11.67	1478.
500	5.04	34.08	496	26.97	115.4	8.19	17.14	1478.
600	4.69	34.15	595	27.06	107.4	9.31	23.39	1478.
800	4.11	34.27	793	27.22	93.5	11.31	37.59	1479.
1000	3.60	34.36	991	27.34	82.2	13.05	53.52	1481.
1200	3.08	34.44	1188	27.46	71.5	14.60	70.90	1482.


TEMPERATURE, C
0
4
8
12
16
0
75
150
225
300
375
PRESSURE, DB
REF. NO. 72 - 6 - 43
48-38.0 N 126-0.0 W
MO.-9 DAY-20 GMT-1.5
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 43 DATE 20/ 9/72
POSITICN 48-38.0N, 126- 0.0W GMT 1.5
RESULTS OF STP CAST 60 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	11.17	31.75	0	24.24	368.8	0.0	0.0	1490.
10	10.69	31.89	10	24.44	350.9	0.36	0.02	1489.
20	9.73	32.34	20	24.95	302.5	0.69	0.07	1486.
30	8.18	32.89	30	25.62	238.8	0.95	0.13	1481.
50	7.56	33.27	50	26.01	202.0	1.39	0.31	1480.
75	7.09	33.77	75	26.46	158.9	1.83	0.59	1479.
100	6.92	33.86	99	26.56	150.5	2.21	0.93	1479.

DEPTH	TEMP	SAL	DEPTH	TEMP	SAL
0.	11.17	31.75	40.	7.90	33.06
1.	10.93	31.76	43.	7.76	33.13
2.	10.81	31.78	44.	7.73	33.17
4.	10.78	31.80	45.	7.71	33.21
6.	10.77	31.80	47.	7.66	33.22
7.	10.77	31.85	48.	7.62	33.22
9.	10.71	31.87	51.	7.53	33.30
10.	10.69	31.89	52.	7.51	33.35
12.	10.60	31.96	52.	7.48	33.40
14.	10.45	32.05	53.	7.45	33.44
15.	10.32	32.12	53.	7.42	33.44
16.	10.17	32.18	56.	7.41	33.45
17.	10.05	32.28	58.	7.39	33.48
18.	9.99	32.29	60.	7.36	33.53
20.	9.73	32.34	61.	7.35	33.57
21.	9.56	32.36	63.	7.33	33.58
21.	9.47	32.40	64.	7.25	33.65
22.	9.29	32.45	67.	7.20	33.70
23.	9.05	32.50	70.	7.16	33.71
24.	8.77	32.55	73.	7.14	33.75
25.	8.61	32.65	73.	7.14	33.76
26.	8.27	32.75	76.	7.07	33.78
27.	8.27	32.81	80.	7.04	33.79
29.	8.21	32.84	81.	6.99	33.80
30.	8.18	32.89	82.	6.96	33.84
31.	8.13	32.89	86.	6.95	33.84
32.	8.10	32.92	88.	6.95	33.85
35.	8.02	32.94	94.	6.93	33.86
36.	8.00	32.99	99.	6.92	33.86
37.	7.97	33.01	100.	6.92	33.86


TEMPERATURE, C
0
4
8
12
16
PRESSURE, DB
0
75
150
225
300
375
REF. NO. 72 - 6 - 44
48-32.0 N 125-33.0 W
MO.-9 DAY-20 GMT-3.2
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 72- 6- 44 DATE 20/ 9/72
POSITION 48-32.0N, 125-33.0W GMT 3.2
RESULTS OF STP CAST 37 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	10.64	31.87	0	24.43	351.2	0.0	0.0	1489.
10	9.20	32.50	10	25.16	281.9	0.32	0.02	1484.
20	8.38	32.80	20	25.52	248.2	0.59	0.06	1482.
30	8.00	33.02	30	25.74	226.6	0.82	0.12	1481.
50	7.69	33.23	50	25.95	207.0	1.25	0.29	1480.

DEPTH	TEMP	SAL	DEPTH	TEMP	SAL
0.	10.64	31.87	22.	8.18	32.88
1.	10.62	31.87	24.	8.11	32.90
2.	10.57	31.95	26.	8.06	32.94
3.	10.43	32.07	27.	8.04	32.94
4.	10.35	32.07	28.	8.01	32.98
5.	10.24	32.17	29.	8.00	33.01
7.	10.15	32.18	30.	8.00	33.02
8.	9.93	32.20	32.	7.98	33.03
9.	9.41	32.42	33.	7.95	33.07
9.	9.38	32.47	35.	7.93	33.07
11.	9.02	32.54	36.	7.90	33.07
13.	8.77	32.62	38.	7.83	33.12
14.	8.65	32.70	39.	7.79	33.13
17.	8.52	32.75	41.	7.77	33.14
17.	8.47	32.77	43.	7.74	33.14
18.	8.39	32.78	46.	7.71	33.15
20.	8.38	32.80	47.	7.69	33.20
21.	8.37	32.83	50.	7.69	33.23
22.	8.34	32.87			

SURFACE TEMPERATURE AND SALINITY OBSERVATIONS
(P-72-6)

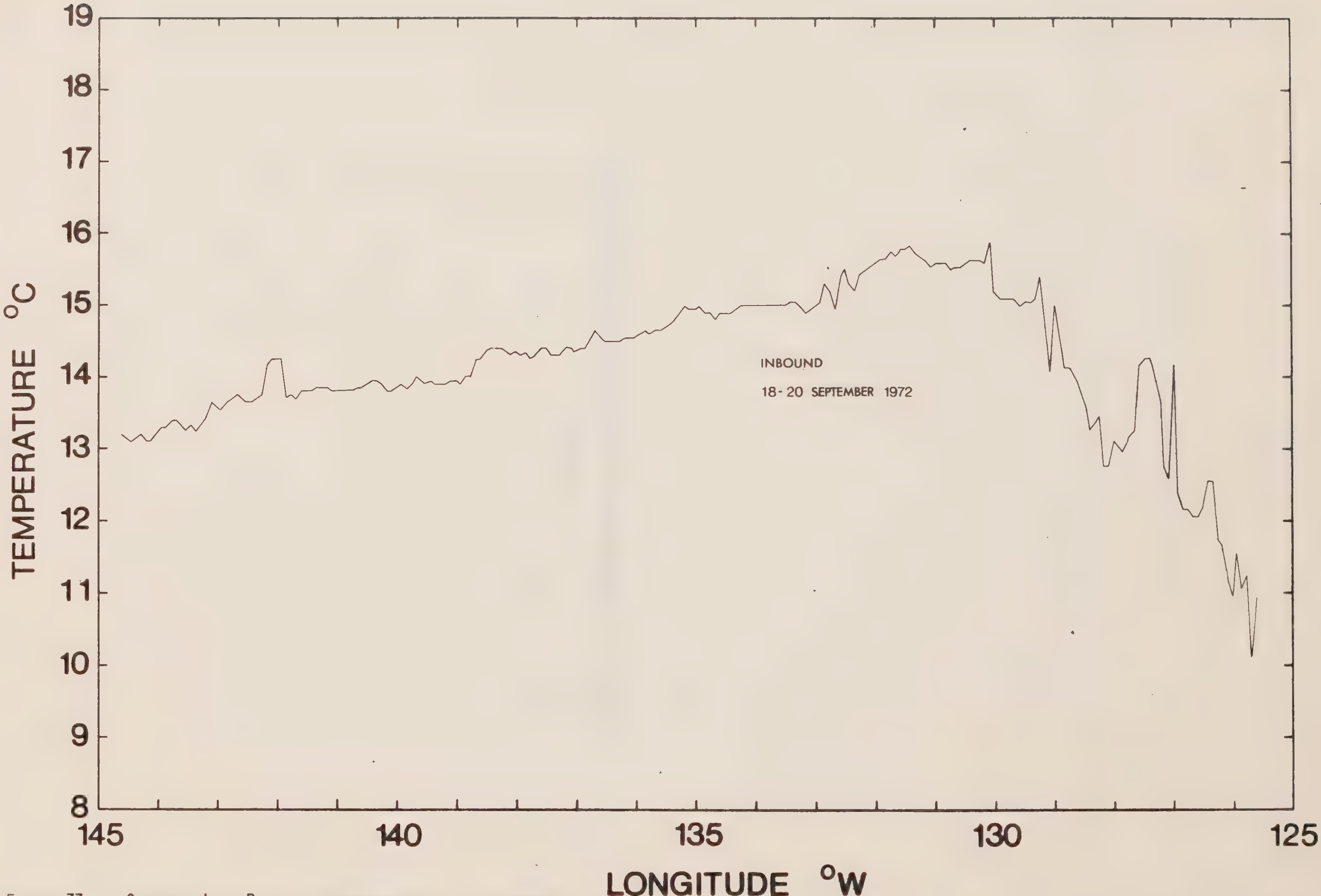


FIGURE 33 GRAPH OF LINE P SURFACE TEMPERATURES AS CONTINUOUSLY RECORDED FROM A PROBE LOCATED AT THE ENGINE ROOM INTAKE (APPROXIMATELY 3 METERS BELOW THE SURFACE) P-72-6.

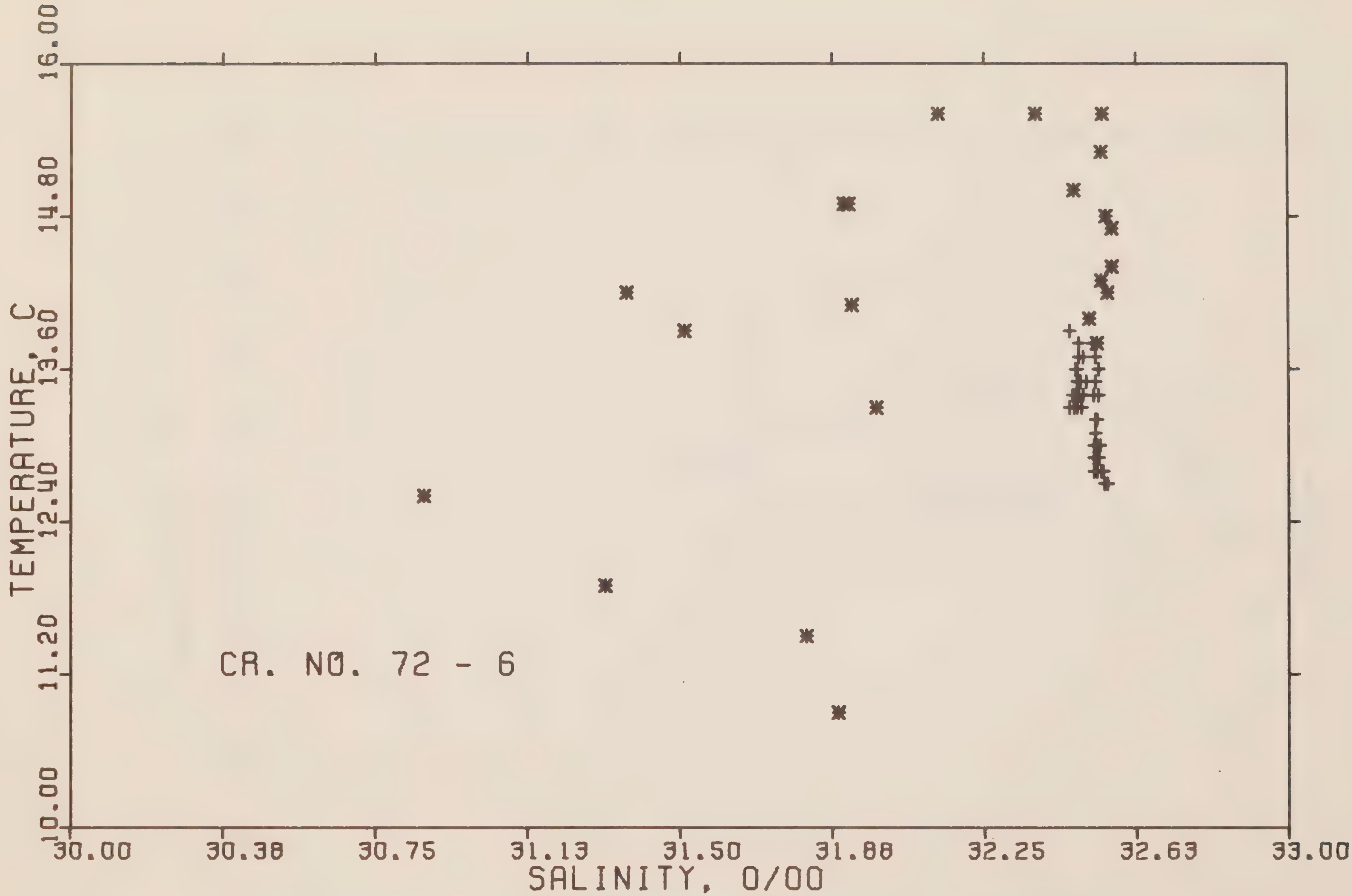


Figure 34 T-S plot of surface temperature and salinity observations on Line P (asterisks) and at station P (pluses) during cruise P-72-6.

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS
CRUISE REFERENCE NUMBER 72- 6

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DY	GMT	0/00	C	WEST
72	8	4	2325	30.869	12.6	125-33
72	8	5	100	31.370	14.2	126- 3
72	8	5	300	31.510	13.9	126-38
72	8	5	845	31.906	14.9	127-40
72	8	5	1140	31.916	14.9	128-40
72	8	5	2000	32.138	15.6	130-40
72	8	6	130	32.543	15.6	132-44
72	8	6	815	32.540	15.3	134-40
72	8	6	1500	32.550	14.8	137- 8
72	8	6	2320	32.538	14.3	138-40
72	8	7	415	32.507	14.0	140-40
72	8	7	1100	0.0	13.3	142-40
72	8	8	0	32.472	13.3	145- 0
72	8	9	0	32.477	13.3	ON STATION
72	8	10	0	32.461	13.3	ON STATION
72	8	11	0	32.468	13.4	ON STATION
72	8	12	0	32.490	13.3	ON STATION
72	8	13	0	32.481	13.4	ON STATION
72	8	14	0	32.476	13.4	ON STATION
72	8	15	0	32.482	13.5	ON STATION
72	8	16	0	32.477	13.6	ON STATION
72	8	17	0	32.486	13.5	ON STATION
72	8	18	0	32.480	13.5	ON STATION
72	8	19	0	32.486	13.5	ON STATION
72	8	20	0	32.501	13.5	ON STATION
72	8	21	0	32.483	13.8	ON STATION
72	8	22	0	32.483	13.7	ON STATION
72	8	23	0	32.495	13.7	ON STATION
72	8	24	0	32.493	13.4	ON STATION
72	8	25	0	32.460	13.9	ON STATION
72	8	26	0	32.552	12.7	ON STATION
72	8	27	0	32.528	12.8	ON STATION
72	8	28	0	32.538	12.8	ON STATION
72	8	29	0	32.548	12.7	ON STATION
72	8	30	0	32.528	12.9	ON STATION
72	8	31	0	32.541	12.8	ON STATION
72	9	1	0	32.521	12.9	ON STATION
72	9	2	0	32.532	12.9	ON STATION
72	9	3	0	32.520	12.8	ON STATION
72	9	4	0	32.526	13.0	ON STATION
72	9	5	0	32.526	13.2	ON STATION
72	9	6	0	32.522	13.1	ON STATION
72	9	7	0	32.529	13.0	ON STATION
72	9	8	0	32.519	13.0	ON STATION
72	9	9	0	32.534	13.0	CN STATION

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS
CRUISE REFERENCE NUMBER 72- 6

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DY	GMT	0/00	C	WEST
72	9	9	0	32.534	13.0	ON STATION
72	9	10	0	32.524	13.2	ON STATION
72	9	11	0	32.530	13.4	ON STATION
72	9	12	0	32.521	13.4	ON STATION
72	9	13	0	32.525	13.5	ON STATION
72	9	14	0	32.525	13.7	ON STATION
72	9	15	0	32.527	13.8	ON STATION
72	9	16	0	32.518	13.8	ON STATION
72	9	17	0	32.533	13.6	ON STATION
72	9	18	0	0.0	13.3	145- 0
72	9	18	800	32.476	13.6	142-40
72	9	18	1250	32.527	13.8	140-32
72	9	18	1705	32.553	14.2	138-40
72	9	18	2200	32.566	14.4	136-40
72	9	19	205	32.566	14.7	134-40
72	9	19	700	32.473	15.0	132-40
72	9	19	1130	32.377	15.6	130-40
72	9	19	1545	31.925	14.1	128-40
72	9	19	1900	31.984	13.3	127-40
72	9	19	2320	31.316	11.9	126-40
72	9	20	210	31.811	11.5	126- 0
72	9	20	300	31.890	10.9	125-33

Pacific Marine Science Report 72-16

THE INFLUENCE OF WIND ON THE SURFACE WATERS OF ALBERNI INLET

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MARINE SCIENCES DIRECTORATE, PACIFIC REGION

PACIFIC MARINE SCIENCE REPORT NO. 72-16

THE INFLUENCE OF WIND ON THE SURFACE WATERS OF ALBERNI INLET

by

David Malcolm Farmer

M.S.D., Oceanographic Section

Pacific Environment Institute

West Vancouver, B.C.

A Thesis Submitted in Partial Fulfilment of
the Requirements for the Degree of
Doctor of Philosophy
in the Department
of
Physics
The University of British Columbia

"Although this report is issued in a Report Series of the Marine Sciences Directorate, the work itself was carried out at the Institute of Oceanography of the University of British Columbia. It should be regarded as a contribution from that Institute."

Victoria, B.C.

Marine Sciences Directorate, Pacific Region

Environment Canada

July, 1972

PREFACE

The following treatise on The Influence of Wind on the Surface Waters of Alberni Inlet constitutes the author's thesis submitted on April 20th, 1972, for obtaining the degree of Doctor of Philosophy at the University of British Columbia.

A project of this nature could scarcely have been undertaken without the active participation and assistance of many individuals. I am particularly grateful to Mr. S. Wigen and the staff of the Canadian Hydrographic Service for combining their own study of Alberni Inlet with mine and for freely providing me with their tide and current data and for the loan of their anemometers. The ship and barge facilities provided by the Fisheries Research Board were essential to the study; I am especially grateful to Dr. Parker for his ready cooperation in making these facilities available from his own programme. I wish to thank Mr. R. Herlinveaux for providing wind data and for his help and interest throughout the programme. It is also a pleasure to acknowledge the invaluable assistance of Mr. R. Page, Master of the M/V "Caligus", to whose skill, knowledge of the area and interest in the project I am greatly indebted. The Fisheries Research Board of Canada and the National Research Council provided financial assistance.

I am most grateful to Drs. Osborn, Burling, LeBlond and Pond for their help and advice and for critically reading the manuscript. Also to Heinz Heckl for successfully building the instrument housings and buoys in time for the field programme and to Peter Merchant for putting together the instrument electronics. Finally I wish to thank Brian Stewart who, with the patience of Job, carefully digitised one third of a million points. Without his help the time series analysis with which this thesis concludes could not have been contemplated.

ABSTRACT

Observations of wind, current and surface layer thickness in Alberni Inlet have helped elucidate some of the ways in which the system responds to a surface stress. The energy of the wind and also the current at 2 meters depth is strongly diurnal. Cross-spectral analysis has shown that the two are closely coupled at this frequency. On the basis of simple time scale considerations I have used phase angles between wind and current to estimate a bulk eddy viscosity for the upper two or three meters of the inlet. This method has yielded values between 1 and 10 cm^2/sec.

On the other hand most of the energy associated with changes in the surface layer thickness is of significantly lower frequency. Strong up-inlet winds induce a sudden thickening in the surface layer at the inlet head and the disturbance appears to propagate back down the inlet suffering an attenuation as it travels. The return to equilibrium can take several days.

A simple two-layer frictional model is able to explain much of what is observed and can be used to predict the surface layer thickness on the basis of measured wind speeds.

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Chapter 1

INTRODUCTION

This thesis describes an experiment to determine the influence of wind on the surface waters of Alberni Inlet.

Anyone familiar with the inlets of Canada's Pacific coast is aware of the strong winds that can occur on these long, steep-sided arms of the sea. Sometimes they take the form of diurnal sea breezes, springing up in the morning and dying away in the evening (Pickard, 1961), or they may be katabatic in nature, sweeping down with great intensity especially during the winter on certain mainland inlets. Superimposed on these shorter period effects there are frequently winds of one to a few days duration associated with the passage of weather patterns moving in from the Pacific Ocean.

In common with many other inlets of the Pacific North West, Alberni Inlet has a thin (3 meter) comparatively fresh layer overlying water of nearly oceanic salinity. This strong vertical salinity gradient dominates the near surface density structure and thus exercises a major control on the system's response to wind.

These wind effects are important. Observations in this study show that changes in the surface layer thickness by a factor of two or more in a few hours are not uncommon. An understanding of the way in which wind affects an inlet will aid oceanographers in their interpretation of the data they collect for biological and physical models of inlet processes. If the wind influence is predictable there is also some hope that by understanding it we may learn how to diminish the

environmental impact of an effluent by timing and distributing its release so as to optimise its disposal.

Alberni Inlet is a particularly good place in which to study these processes. The Pacific Oceanographic Group of the Fisheries Research Board in Nanaimo has collected much valuable background information from the area since 1939. Unlike many of the mainland inlets, Alberni Inlet is also readily accessible and has the advantage of being comparatively free of sudden changes in direction or width. The ready co-operation of Dr. Parker in making Fisheries Research Board vessel and barge facilities available from his own Alberni Inlet project has made it possible to carry out the long time-series study which is essential in identifying the strongly time-dependent effects of wind action.

This project began with a pilot study during August 1970 in which I used a thermistor chain and chart recorder, borrowed from the Pacific Oceanographic Group, to measure temperature continuously at eight depths from the F.R.B. barge at Port Alberni. The results confirmed the belief that wind has an important influence on the thickness of the surface layer and also provided the background data necessary in designing instrumentation to measure the effect. Towards the end of the pilot study it became clear that with the seasonal decline in surface temperatures thermistors could not provide a reliable means of estimating the thickness of the upper layer. Further observations required the preparation of special instruments to monitor conductivity; these instruments are described in Chapter 2.

The main thrust of the experiment was timed to overlap the Hydrographic Service current and tide programme carried out during

February and March 1971, though the field-work of my study extended into May. Chapter 3 includes a description of these observations in addition to some of the relevant current data. In Chapters 4 and 5 I subject the data to time series analysis and draw on simple linear theory to explain some of the more important results. The thesis concludes with a summary of the work accomplished.

Survey of Previous Work

Alberni Inlet is one of the more extensively studied estuaries on Canada's Pacific coast. In 1939 and 1941 the Pacific Oceanographic Group (1957) took a series of observations which formed the basis of an important study by Tully (1949) in which the nature of the circulation was described with a view to predicting the effects of pollution from a pulp mill.

Tully's paper occupies a significant place in the development of our understanding of fjord circulation and other workers have used his results as input to theoretical models (e.g. Stommel, 1951 and Rattray, 1967). Since Tully's study, intermittent observations have continued (Pickard, 1963; Waldichuk, Meikle and Hyslop, 1968). Pickard (1963) reviewed some of these data with special reference to the exchange of deep water. More recently efforts have been made to monitor water quality in Alberni Harbour (Waldichuk, Markert and Meikle, 1969) and the inlet has also become the focus of an intensive biological programme. Severe damage at Port Alberni resulting from the tsunami of March 1964 prompted Murty and Boilard (1969) to develop a barotropic model of the inlet using numerical techniques.

It has been known for a long time that wind influences the surface structure of inlets. Sandstrom (1904) found that the distribution of low salinity water in the Gullmarfjord depended upon wind direction. Pettersson (1920) studied the same phenomenon using regression analysis on a long series of daily salinity measurements taken at Bornö.

In his analysis of Alberni Inlet Tully briefly describes some of the wind effects. He found that up-inlet winds tend to increase the depth of the upper zone and he includes a diagram to show that the surface layer increases in thickness from 3 to about 7 meters following three days of strong up-inlet winds. He also attempted to relate the wind effect to other factors such as river discharge, but these results were not conclusive.

In an intensive set of current measurements taken from an anchored ship in Knight Inlet, Pickard and Rodgers (1959) found some evidence of deep (40-100 m) compensating currents associated with wind-stress, in addition to surface effects. They also found that up-inlet winds could only reverse the surface flow for a limited time suggesting the build-up of pressure gradients to oppose the wind action.

Gade (1963) and Johannessen (1968) describe certain wind effects measured in the Oslofjord area of Norway. Both observers found surprisingly long phase-lags of about 10 hours between the wind and the near-surface current. Gade (1970) discusses current measurements in the Vestfjord taken after a few hours of fresh up-inlet winds which indicate a three-layer current system with inflow at the surface and at depth and with an outflow between. He also demonstrates that persistent winds set up strong horizontal salinity gradients along the axis of the fjord.

Rattray (1967) used measurements from East Sound, Orcas Island, during 10 hours of strong up-inlet winds to derive estimates of eddy viscosity. Assuming the equations of motion to be a balance between horizontal pressure gradient and the vertical stress gradient he found eddy viscosities ranging from 6 cm^2/sec at the bottom to 90 cm^2/sec at the surface. He also includes wind-stress in his similarity model of fjord circulation, and shows that an up-inlet stress displaces the down-inlet flow to greater depths.

Practical engineering aspects have inspired a recent attempt to understand the phenomenon. Wada (1966) describes a study of wind effects from the point of view of designing cooling water intake structures. Henry and Murty (1971) are using numerical techniques in their analysis of wind effects on Departure Bay, British Columbia.

Most of these studies have concentrated on the steady state effects produced by the wind; yet it appears likely that in fjords the stratified waters are in a state of almost continuous dynamic imbalance as the surface is subjected to a rapidly changing wind-stress. It is a central aim of this thesis to explore the time-dependent structure of this response and to demonstrate its behaviour under the influence of a changing wind-field.

PART I

INSTRUMENTATION AND OBSERVATIONS

Chapter 2

INSTRUMENTATION

Any experiment designed to measure time dependent effects must necessarily take account of the more important variables involved. In this experiment I have assumed that the forcing functions dominating changes in the structure of the inlet surface waters are the wind-stress, the tide and the river run-off.

Long-term tidal measurements are taken at Port Alberni; however the Hydrographic Service greatly extended the collection of tidal data during the programme with the installation of seven supplementary gauges along the Inlet, (Figure 1). MacMillan Bloedel Ltd. collect river flow data from a gauge on the Somass River at the inlet head and they kindly passed on their measurements for the duration of the programme. The Hydrographic Service provided four Lambrecht anemometers (Plate III, 2), page 24. These are clockwork instruments that run for one month between chart replacements, providing a record of wind speed and direction from which hourly values may be taken.

The response of the inlet to wind, tide and run-off will be in the form of fluctuations of the current, density structure and sea surface slope along the inlet. Recording current meters installed as part of the Hydrographic Service programme supplemented by drift pole measurements, provided a means of observing currents. Specially built conductivity profilers were used to estimate the density structure. In principle at least, tidal data from along the inlet should provide a

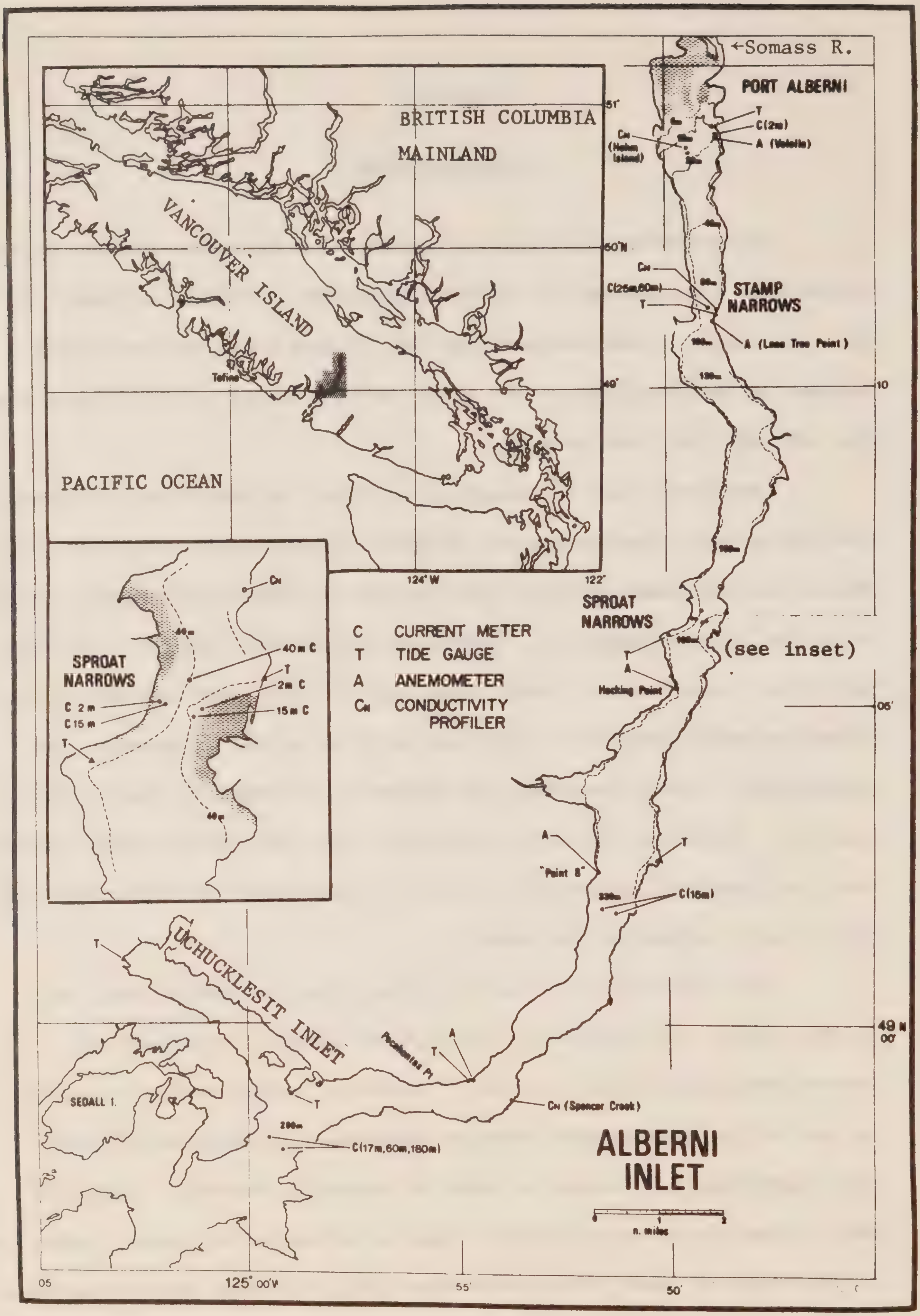


Figure 1. Map of Alberni Inlet, showing location of instruments.

record of the sea-surface slope. These slopes are small, however, and could not reliably be separated from the background noise in this study.

Disposition of the Instruments

Anemometers

The four Lambrecht anemometers recorded wind speed and direction at prominent points along the inlet. Prior to the installation of these instruments, data were available from an anemometer mounted on the roof of the F.R.B. barge "Velella", (Figure 1). In choosing the most representative points along an inlet in which local topography greatly influences the winds, I relied on the advice of Mr. R. Page, Master of the "Caligus", who has considerable experience of wind conditions in the area.

The instruments were mounted on 2 meter poles grouted into the rock in positions as exposed as possible. The intention was to obtain data that would be representative of wind-stress over the water. Obviously this was possible only in the loosest sense, since the rock itself must influence the measured wind-speed; nevertheless field experience did indicate that the locations were reasonably representative of wind conditions over the water.

Current Meters

Only the current records from Sproat Narrows were used in this study. These meters were located at 2m, 15m and 40m as shown in Figure 1. The necessity of avoiding the shipping route and the danger of anchoring buoys too near the submarine cables influenced the choice of mooring locations. Canadian built Neyrpic current meters were used;

these instruments record integrated 10 minute currents on punched paper tape. Some drift-pole and drogue measurements were also taken.

Conductivity Profilers

These instruments were built specially for this project and will be described in a separate section. One was moored to a floating dock adjoining Hohm Island and the remaining two were attached to log-booms located near the South shore just up-inlet of Stamp and Sproat Narrows (Figure 1). During the last month of the experiment the Stamp Narrows instrument was moved to Spencer Creek. In addition, measurements were taken for a week with an instrument moored on each side of Sproat Narrows, to search for transverse isohaline slopes.

The period of observation extended from February to May 1971 as shown in Table I.

Table 1

Dates and Locations of Instruments

Instrument	Location	Depth of Mooring	Date In	Date Out
Conductivity Profiler 1	Hohm Island	16 m	Feb 12	May 12
Conductivity Profiler 1	Sproat Narrows North	20 m	May 12	May 20
Conductivity Profiler 2	Stamp Narrows	20 m	Feb 12	Apr 7
Conductivity Profiler 2	Spencer Creek	36 m	Apr 7	May 11
Conductivity Profiler 3	Sproat Narrows South	29 m	Feb 8	May 20
Current Meters* (2m)	Sproat Narrows		Feb 9	May 10
Anemometers 1	Pocahontas Point		Feb 24	May 11
Anemometers 2	Point 8		Feb 24	May 11
Anemometers 3	Hocking Point		Feb 24	May 20
Anemometers 4	Lone Tree Point		Feb 25	May 20

*Instruments installed and maintained by Canadian Hydrographic Service.

Conductivity Profiler

This instrument was built to monitor the conductivity profile at frequent intervals so as to obtain an almost continuous record of the surface layer thickness.

In summer and during certain winter conditions the temperature distribution alone may be used to infer the main features of the density distribution. Such is not the case, however, in the autumn, late winter and spring, when the water column can be almost thermally homogeneous. In these conditions it is necessary to monitor the density profile by conductivity measurements.

It is preferable, of course, to measure both conductivity and temperature, from which the salinity and density profiles may be determined. In typical oceanic conditions the effect of temperature on conductivity makes salinity estimates based on conductivity observations alone almost worthless. However, the surface waters in an inlet with significant run-off such as Alberni Inlet, have an intense salinity stratification that completely dominates the conductivity profile. In turn, it is the salinity distribution which dominates the density profile. One may therefore infer the main features of the salinity and density distribution by measuring the conductivity profile alone, thus permitting the use of a much simpler instrument than would otherwise be required. The profile estimate can be improved, of course, by incorporating such background information on temperatures as may be available.

It should be emphasised that the instrument will not provide really accurate data, in the sense to which we have become accustomed using classical oceanographic methods of observing salinity and

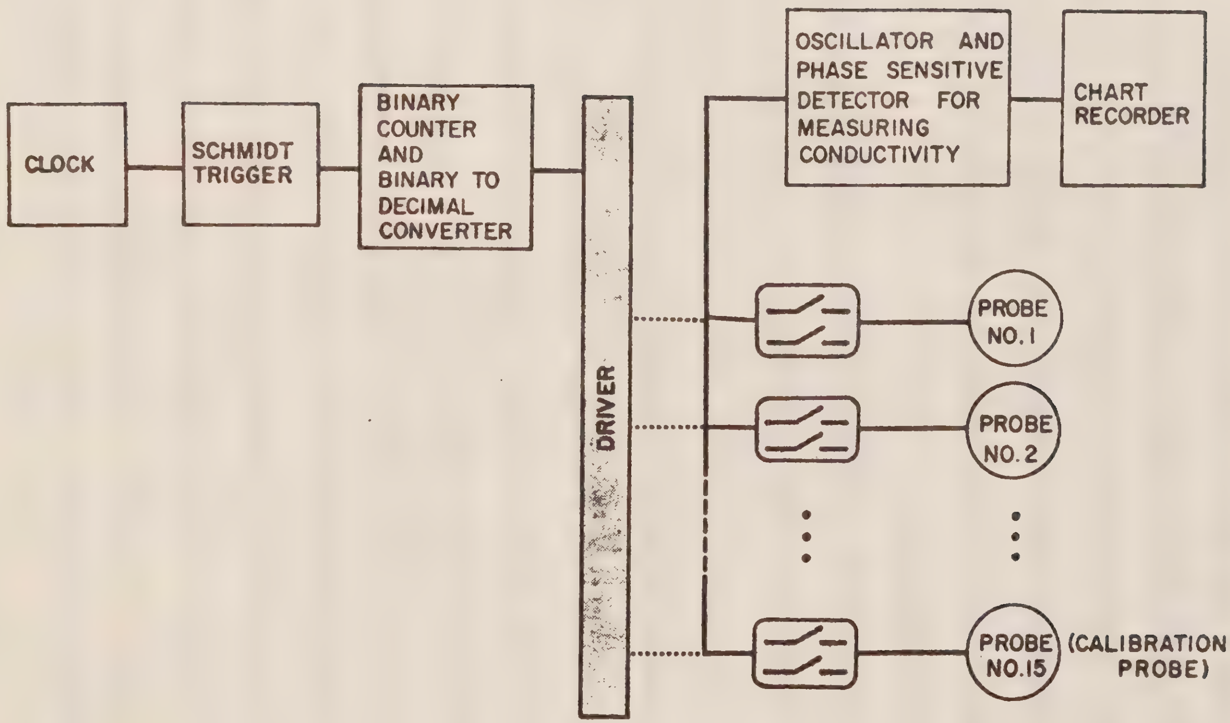


Figure 2. Block diagram of electronics for conductivity profiler.

temperature. Rather it was designed to measure the gross effects, such as a thickening of the surface layer by a factor of more than two in a few hours. The data obtained have confirmed the value of the approach for this problem.

Principles of Operation

The instrument measures the electrical conductivity of sea-water at fourteen depths by successively interrogating, for one minute at a time, each of the fourteen conductivity probes on the chain. There is a fifteenth probe inside the instrument housing which serves as a check on any drift in the response of the electronics.

Nasmyth (1970) has described the method used to measure conductivity. Briefly, a 1.5kHz oscillator supplies a signal to the primary circuit of a toroidal transformer. The magnitude of the signal induced in the secondary circuit depends upon the electrical conductivity of the sea-water loop which surrounds and passes through the center of the transformer. The toroidal probe casing is made entirely of plexiglass. Plate I shows how the parts are sealed together using ethylene dichloride in a hypodermic syringe, and also includes a photograph of the completed probe in position.

An electrically wound hobbyist's clock controls the timing. This inexpensive unit has an accuracy of better than 4 minutes per week. A photo-transistor in the clock-face and a small lamp just above it are so mounted that once each minute the clock's second hand cuts the light path between the two, (Plate I, 3). The photo-transistor fires a Schmidt Trigger which operates the counting logic and switches into the circuit the appropriate probe (Figure 2).

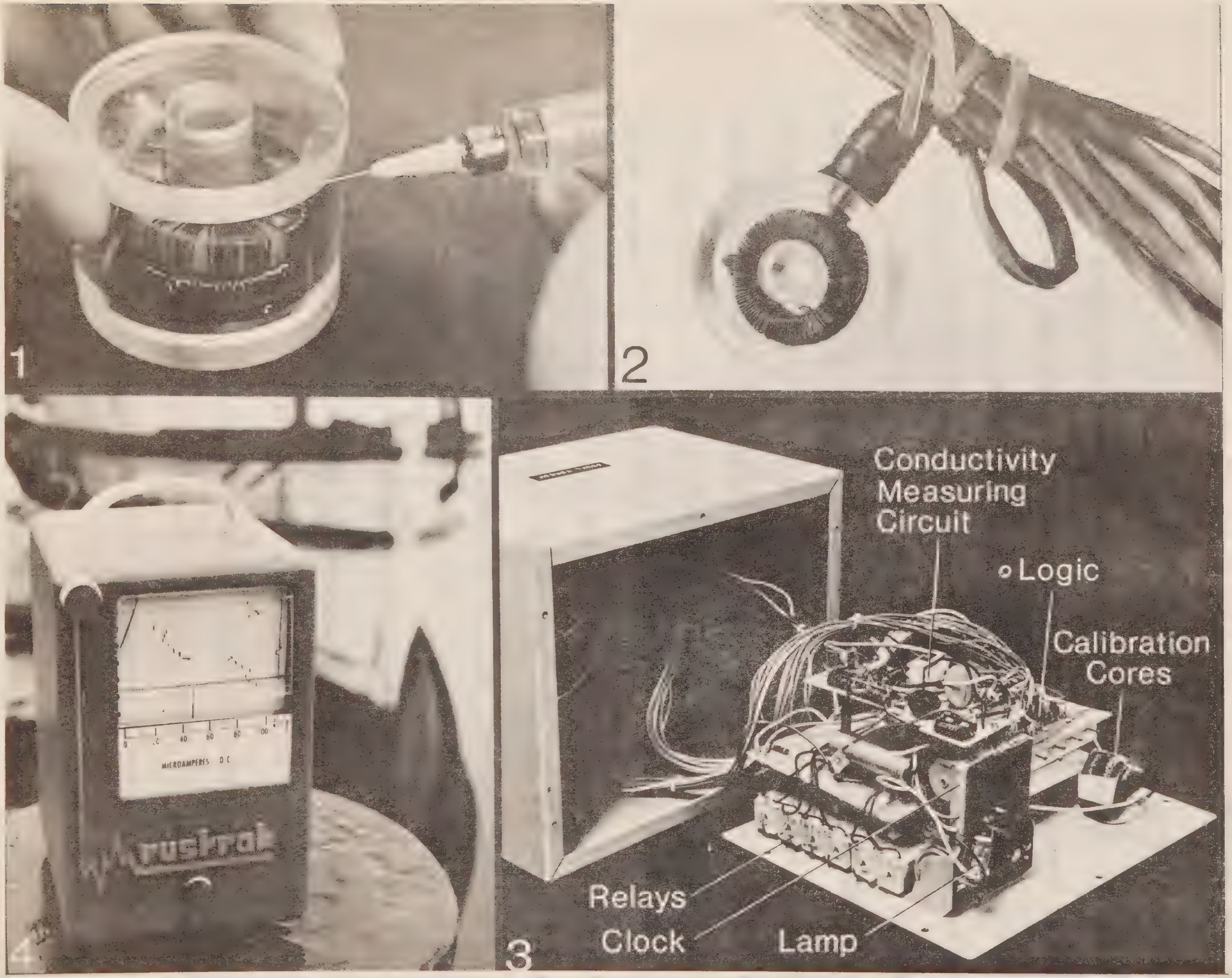


PLATE I - Conductivity Profiler
(1) Sealing the probe casing with ethylene dichloride (2) Probe in position on cable
(3) Layout of electronics (4) Output on chart recorder

Output from the conductivity measuring circuit is fed to a Rustrak chart recorder. This type of record has to be laboriously digitised but was chosen in place of a magnetic tape for reasons of cost, simplicity, reliability and availability.

The deepest probe is interrogated first, then the next deepest and so on. In this way the depth corresponding to a particular reading can be found from its position relative to the rest of the group. A second pen tracing a line in one of two positions along the right hand margin of the chart paper, is switched on with the eighth probe and thus serves as a check on the probe sequence. Plate I shows photographs of the electronics and also the chart recorder with typical output on it.

Instrument Housing and Protection

Water-tight containers of P.V.C. tubing separately house the batteries and instrument. Four low specific gravity 6 volt lead-acid batteries provide power. A converted fibre-glass marker buoy with a lid at one end and an inner sheath of plastic foam affords shock protection and floatation for the battery and instrument cases (Figure 3).

This arrangement permits fairly easy servicing from a small vessel. I recharged the batteries every two weeks and replaced the chart-paper every week. When replacing the chart-paper alone, it was possible to lift the instrument box out of the buoy and on to the ship's deck, since there was a sufficient length of cable to the battery case. Battery replacement required the use of the ship's winch to lift the battery container on board. At all times the buoy remained moored to the log-boom or floating dock to which it was attached.

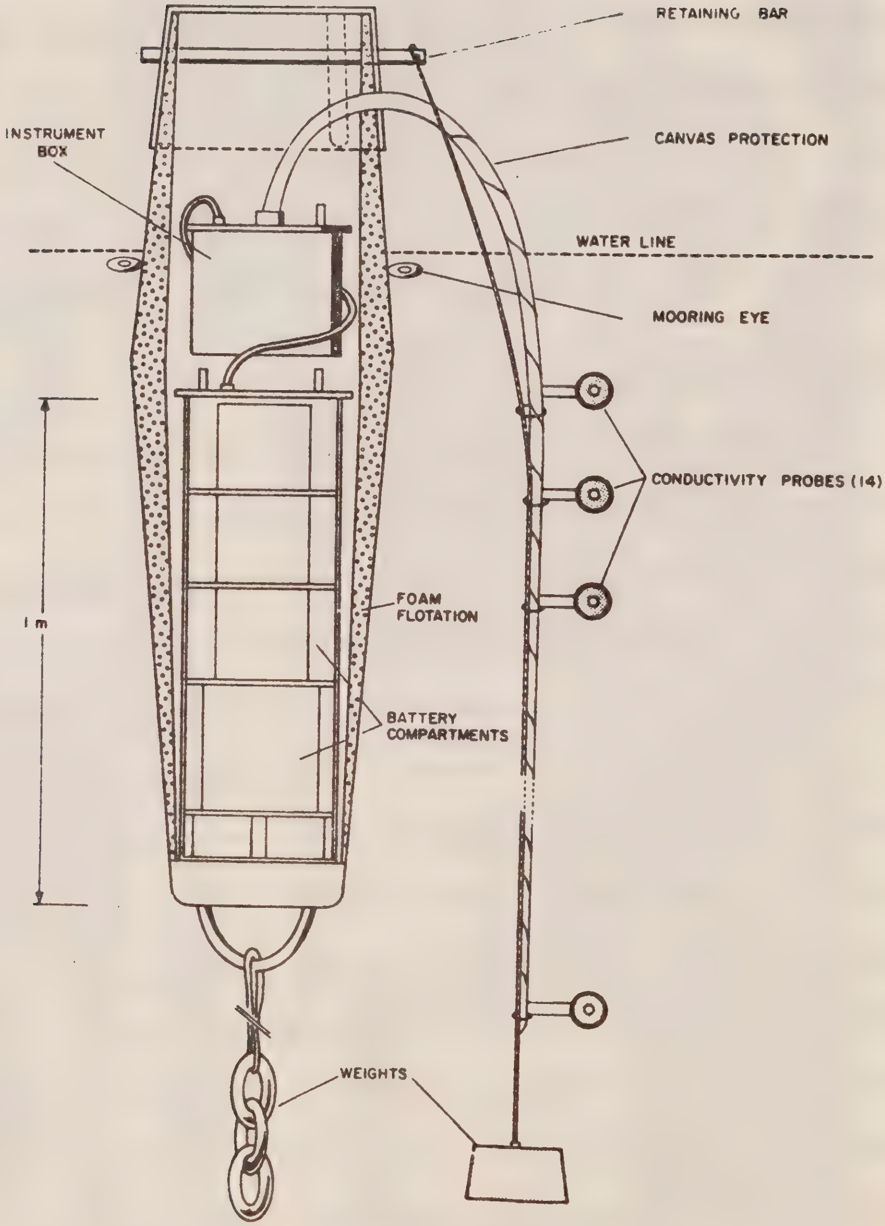


Figure 3. Construction diagram of conductivity profiler buoy.

Calibration

Each probe is calibrated by immersing it in a large container of salt water of known temperature, for which the conductivity may be accurately determined by other means. After noting the output, the cell is removed from the salt solution and a conducting loop in series with a potentiometer is passed through the probe. In this way it is possible to find a cell constant Kc in terms of the solution conductivity Sc and the 'equivalent resistance' Req of the potentiometer that just yields the same output as that obtained with the cell in solution: i.e.:

$$Kc = Req \cdot Sc$$

The cell constant is independent of the solution conductivity or the electronics response, being determined solely by the geometry of the cell casing. In practice it was determined from several such calibration tests using solutions of different salinities and an average value was taken.

Having found the cell constant the actual output reading corresponding to different conductivities is found by simply adjusting the potentiometer through a range of values and recording the output. The reading on the chart recorder depends almost linearly on the conductivity being measured. A convenient functional approximation between conductivity and measured output may be obtained by a least squares fit to the equation

$$\text{Conductivity} = Kc\,\{a_o + a_1 x + a_2 x^2\}$$

where x defines the recorded output and the coefficients a_i are

determined from the range of values produced by different potentiometer settings.

Nasmyth quotes a short term relative sensitivity better than or equivalent to 0.005 σ_t, and a shift in absolute accuracy over 3 weeks of 0.07 σ_t. No such high level of accuracy was sought with the present instrument, although it should presumably be attainable, since the conductivity measuring part is basically similar. σ_t calculations require a knowledge of temperature, and this was not obtained. Moreover the Rustrak chart recorder limits the repeatability of a single measurement to about one part in a hundred. It is estimated that the recorded output had a relative accuracy between probes of better than ± 1 millimho/cm and an absolute accuracy better than 2 millimhos/cm. The range measured was from a little over 0 millimho/cm to about 35 millimhos/cm.

Chapter 3

OBSERVATIONS

A project of this type could scarcely have been undertaken without the active support of the Fisheries Research Board whose ship and barge facilities in Alberni Inlet provided the essential logistic support.

The observation period of February 12th to May 20th, 1971, involved eighteen field-trips to the inlet. I used the F.R.B. barge "Velella", which was docked in Port Alberni as a base; most of the field-work was done from the Fisheries Research vessel "Caligus" (Plate II, 2 and 4). Captained by Mr. R. Page this maneuverable vessel was ideally suited to inlet work of this type. When the Caligus was unavailable I used the F.R.B. "Melibe" (Plate II, 1).

The field-trips each involved one full day, and were mainly concerned with maintaining the conductivity profilers. Batteries on these instruments had to be recharged every two weeks. To reduce the work load, the change-over was staggered so that no more than two sets of batteries were replaced on any one day. The rest of the day was taken up with changing the conductivity recorder charts, cleaning the conductivity probes, taking in situ salinity and temperature measurements and also replacing the anemometer charts as required.

The conductivity profiling instruments were completed just in time for the experiment and were therefore used without prior field testing. Their maintenance involved considerable effort and the

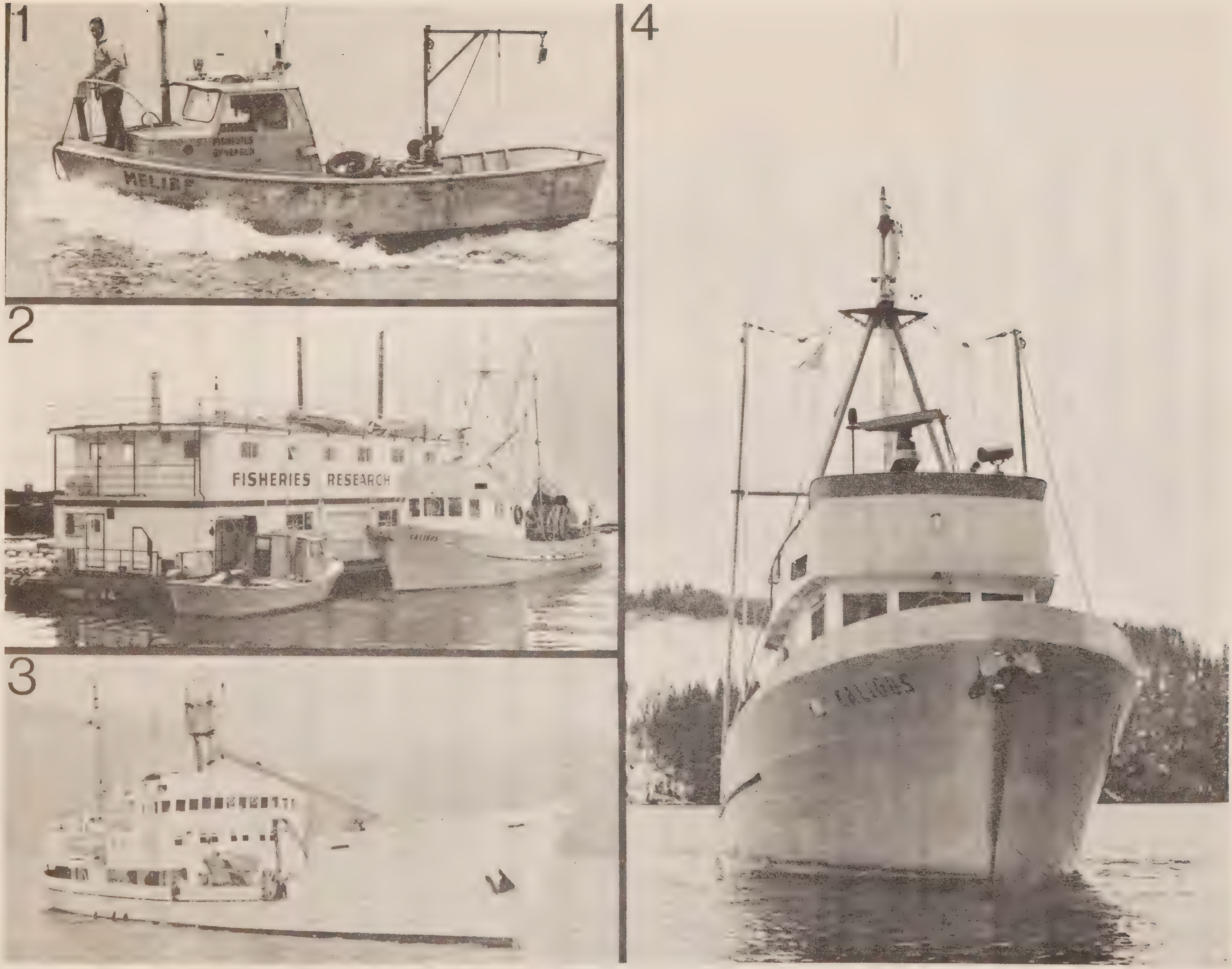


PLATE II - Vessels used in Alberni Inlet project

(1) F.R.B. M/V "Melibe" (2) F.R.B. barge "Velella" with M/V "Melibe" and M/V Caligus"
(3) C.S.S. "Parizeau" (4) M/V "Caligus"

PLATE III - Field work in Alberni Inlet

(1) Raising conductivity profiler buoy
(2) Lambrecht Anemometer
(3) Lowering conductivity probes into water at Stamp Narrows

conductivity records include several gaps. Failure of the chart recorders, failure of the switching lamps and leakage of water into the instrument housings were the main sources of trouble. Nevertheless, the instruments did yield useful data for about 60% of the time that they were in the water.

The Canadian Hydrographic service undertook the current measurement and tidal programme. This work was principally carried out from the C.S.S. "Parizeau" (Plate II, 3).

Wind and Current

Wind

Figure 4 shows data taken from the four anemometers. The windspeed is shown as either up-inlet or down-inlet, since at the four locations chosen the transverse component was negligible.

This section of data is typical and demonstrates two features that were consistent throughout the observation period. The winds have a strong diurnal component and they are also similar at each of the four stations, with the exception of the Pocahontas record, which is similar in shape but is biassed in the 'Down-Inlet' direction. Calm waters are often seen off Uchucklesit Inlet 4 miles west of Pocahontas Point, while winds of 5 meters/sec occur up-inlet of this area.

Currents

I have only considered the current measurements taken at Sproat Narrows in this analysis. The data are in the form of components resolved along the major axis of the measured distribution of directions and were supplied by the Canadian Hydrographic Service.

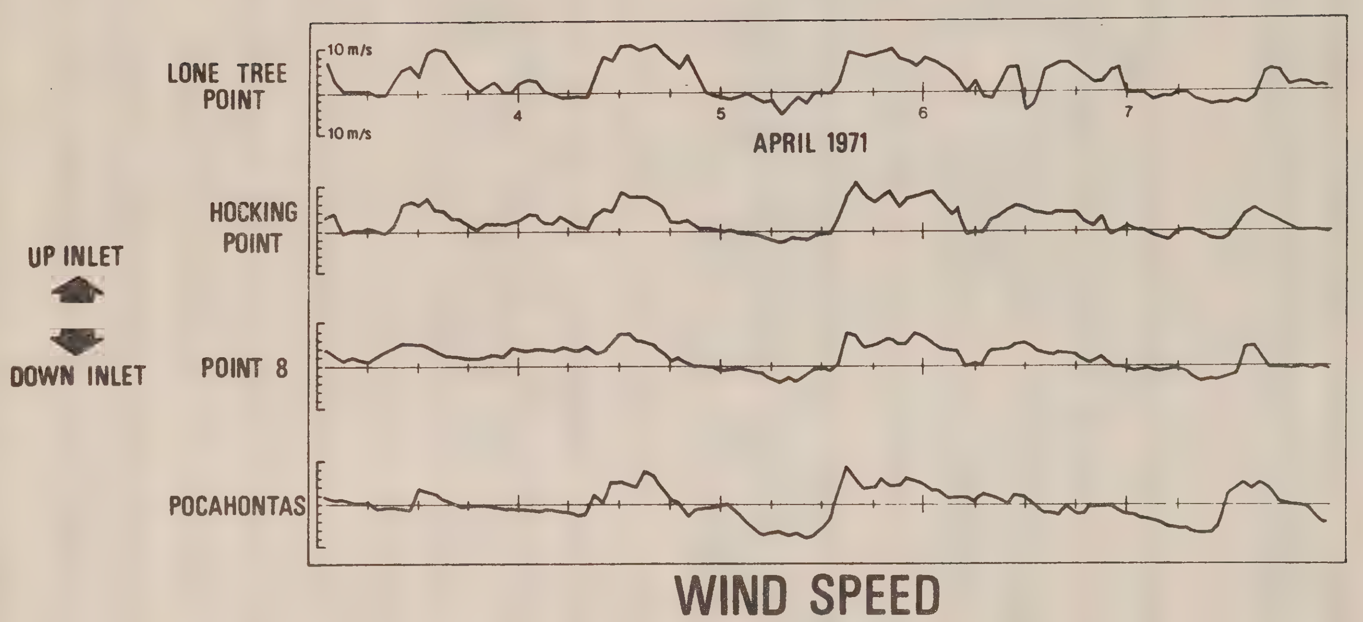


Figure 4. Sample record of wind measurements at four locations.

Histograms showing the distribution of currents with respect to direction from each instrument indicate that there is usually only a small transverse component. These and other details largely irrelevant to the present programme are described by the Canadian Hydrographic Service (1972).

Figure 5 shows a typical section of Sproat Narrows current data at depths of 2, 15 and 40 meters. Only one each of the two 2m and 15m records are included, both from the North side of the channel, but they are representative of measurements on the South side, which they follow closely. Superimposed on the 15m current record is a plot based on hourly values of tidal height measured at Port Alberni. The figure also includes wind observations and average daily river discharge figures for the Somass River.

The 2m current data show a net down-inlet flow on which is superimposed a tidal fluctuation. The most striking feature of the record, however, is the strong up-inlet flow which appears to be strongly correlated with the wind. There is also a fair amount of high frequency energy in the current.

At 15m the current is closely related to the tidal height which it precedes by about 2 hours, but there does not appear to be any obvious or consistent relationship with the wind.

The current at 40m is remarkable in that it flows down-inlet on the ebb, yet has little or no component on the flood. There is no obvious explanation for this result and it may be due to instrumental error.

The Canadian Hydrographic Service also undertook a number of

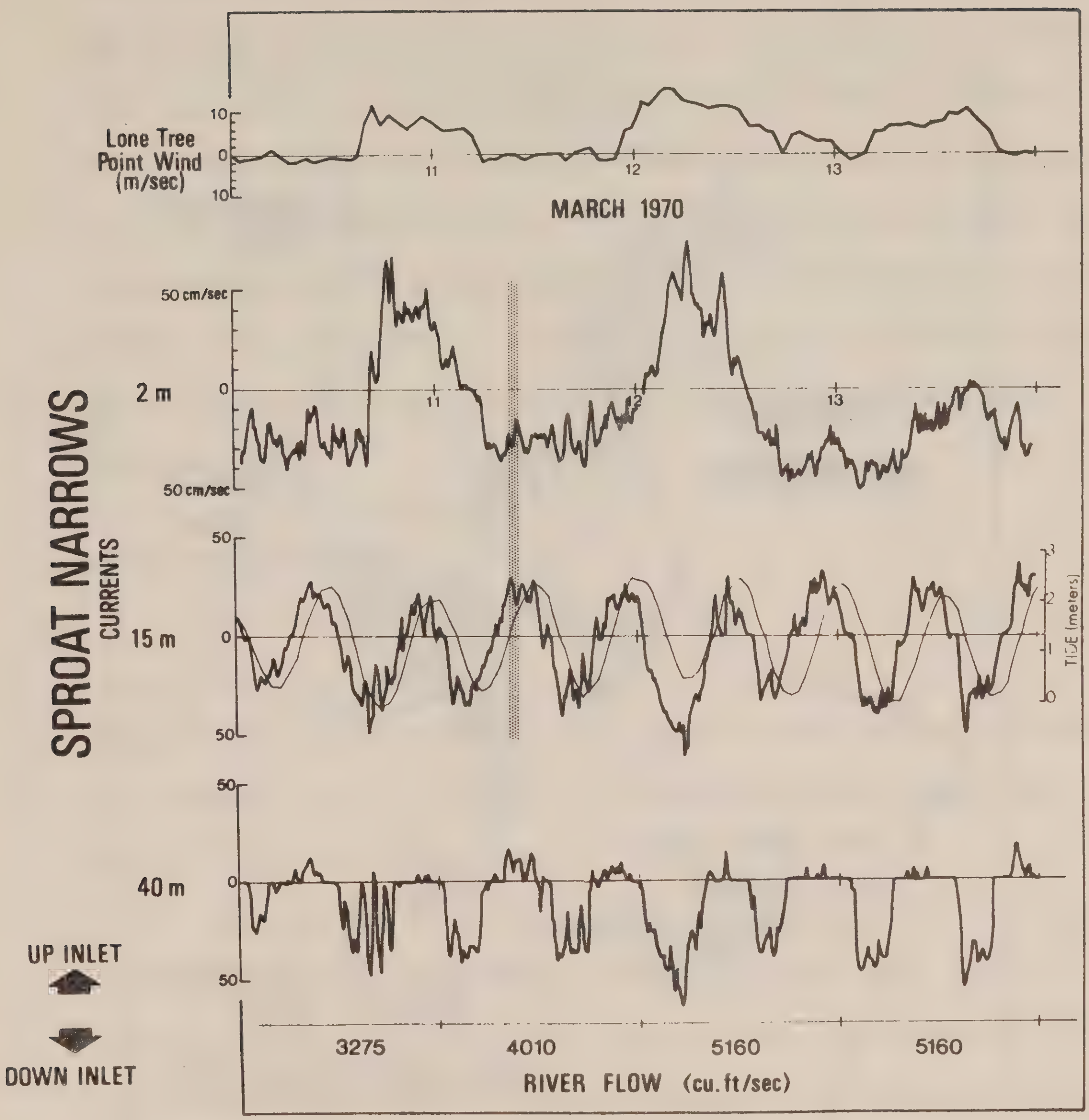


Figure 5. Wind, current and mean daily river discharge. Measured tidal elevation at Port Alberni is superimposed on 15m current. The vertical grey line indicates time of drift pole measurements shown in Figure 6.

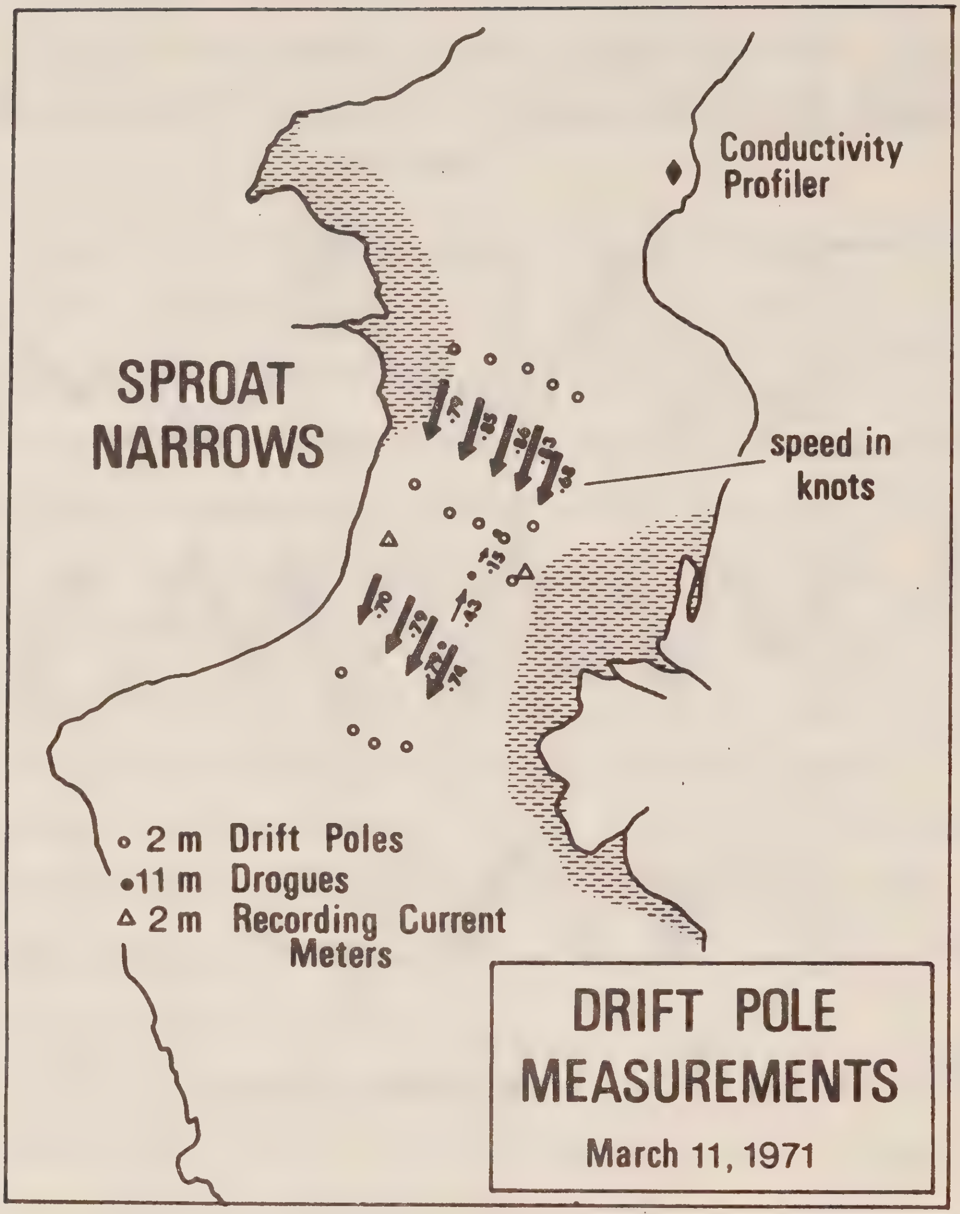


Figure 6. Drift pole and drogue measurements at Sproat Narrows.

1 knot = 51.48 cm/sec.

(Courtesy Canadian Hydrographic Service)

drift-pole measurements in the Sproat Narrows area. The purpose of these was to gain some insight as to the extent to which the 2m current records were representative of the general surface flow. In addition some 11 and 20m drogue measurements were taken. Figure 6 shows a typical set of drift-pole data collected on March 11th. A vertical grey line in Figure 5 indicates the timing of the measurements. The records show that the current is approximately 10 to 20% greater in the middle of the inlet than at the sides. The upstream flow indicated by the 11m drogue seems consistent with the 15m current measurements shown in Figure 5.

Conductivity Records

Each chart record was digitised with a chart digitiser and the output punched onto paper-tape. The paper tape was transferred to magnetic tape on the University of British Columbia IBM 360 computer and converted back into conductivity using the relationship found during the calibration procedure.

This procedure results in a three-dimensional array of points, the respective axes being depth, time and conductivity. Using an interpolation between the points one may search for contours of constant conductivity on a chart of the conductivity at each depth against time. The result is a graphic description of the detailed changes occurring in the measured water column.

Figure 7 shows one such plot taken near Hohm Island in February 1971. The contours clearly demonstrate the sudden thickening of the surface layer associated with strong up-inlet winds on February 14th and also the internal tidal oscillation. The vertical spread of contours

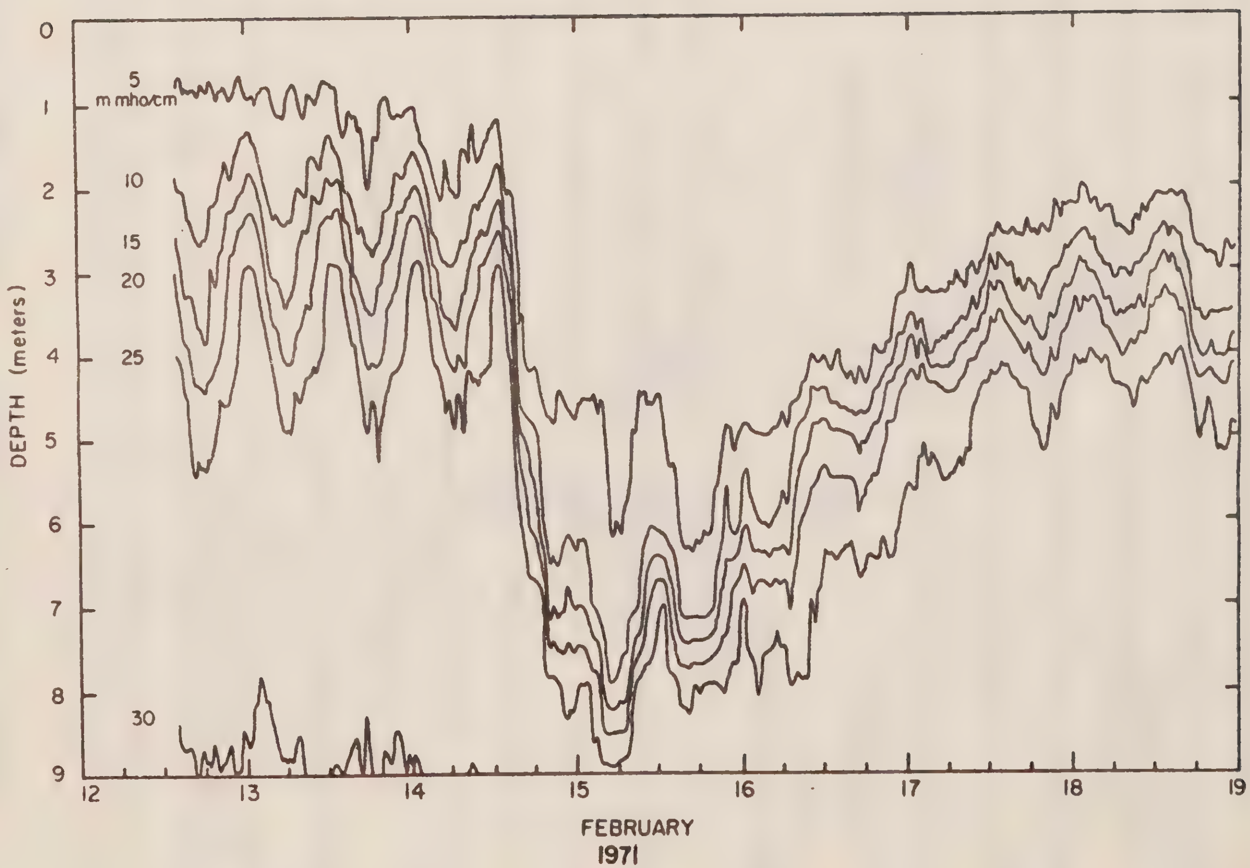


Figure 7. Contours of constant conductivity taken at Hohm Island. Wind and 2m. current measurements for this data are shown in Figure 10.

is indicative of the different degree of mixing present. For example the stratification is more intense during that part of the internal tidal oscillation (peaks on the diagram) during which the surface layer is thinnest than during the part at which it is thickest (troughs on the diagram).

Parameterisation

Contour plots of this type provide a very detailed description of the conductivity distribution, but for analysing large quantities of data it is more convenient to summarise the results at any given time with appropriate parameters. Two parameters seem relevant: a length scale associated with the thickness of the surface layer and a parameter indicating the extent of the mixing.

I define the thickness length scale H_f as that thickness of fresh water which would occur if the measured water column were separated into two layers: a surface layer of fresh water and a lower one whose salinity was equal to that found at the greatest depth of measurement H. The lower layer of thickness $H - H_f = H_s$, is understood to include all the salt in the original water column. Thus

$$\text{Fresh Water Thickness} = H_f = \left[H - \frac{1}{S(H)} \int_o^H S(z)\, dz \right]$$

where H is the greatest depth of measurement and S(z) is the salinity at depth z.

The second parameter ΔPE represents the difference between the potential energy per unit cross-section of the two layer system just defined, and the potential energy per unit cross-section of the observed distribution. The potential energy is calculated with respect to the

lowest probe. Let the origin be at the depth of the lowest probe and the positive z axis point vertically upwards; then the Potential Energy Difference is

$$\Delta PE = g \int_0^H z\rho_m(z)dz \; - \tfrac{1}{2}g \left[\rho_s H_s^2 + \rho_f (H^2 - H_s^2)\right]$$

where ρ_m is the measured density distribution and ρ_s and ρ_f are the densities of the salt and fresh-water layers respectively.

Determination of salinity and density requires a knowledge of temperature. As mentioned earlier, only conductivity was monitored, since the salinity was so great that it dominated both conductivity and density profiles. It is possible to estimate both H_f and ΔPE by using salinity and density profiles calculated on the basis of a constant temperature distribution. Some temperature data are available however, and I have incorporated them in the following way.

The data are in the form of weekly observations of temperature, conductivity and salinity I took with an in situ salinometer alongside each instrument and also river water temperatures taken every few days by McMillan Bloedel who operate the pulp mill at Port Alberni. Interpolating between the measurements two basic temperatures were estimated: that of unmixed river water entering the inlet and that of sea-water at 9m. The temperature of the water at 9m rarely changed more than 0.1 $^{\circ}$C in one week. River water temperatures varied 3° or 4°C in one week in extreme conditions. I calculated temperatures at depths less than 9 meters on the assumption that the measured conductivity indicated the extent of mixing between river water and the water at 9 meters, and that temperature differences were linearly related to the conductivity differences. This is a very rough approximation, but

probably as good as any other under the circumstances. The worst possible error in σ_t estimates due to lack of temperature data would be less than 10%; typically the error would be much less than 5%.

It is worth noting that the effect of temperature on the conductivity of sea-water increases with increasing salinity, yet in the case considered here, the depth of highest salinity and hence the depth most sensitive to temperature errors, was also the most thermally stable. This condition tends to favour the type of approximation made above. On the other hand, heat exchange through the surface of the inlet is completely neglected.

The choice of parameterisation is necessarily rather arbitrary. In addition, the two estimates of H_f and ΔPE are unlikely to be independent of each other. For example when the surface layer becomes very thick the conductivity gradient associated with the halocline may influence the conductivity at depth H. This change in turn will alter the salinity estimate for the salt-water layer and thus the ΔPE estimate as well. I used the weekly average of salinity estimates in computing the density of the lower layer, in an attempt to reduce this effect. The problem stems from the fact that 9 meters was not always an adequate depth for monitoring the type of effects with which we are concerned. Nevertheless, the two parameters do seem to reproduce the main features indicated by the contour plots.

An advantageous consequence of the vertical integration involved in the parameterisation is that it tends to average out the effect of relative inaccuracies between the probes in any one probe chain. The parameter estimates were based on successive observations taken 15 minutes apart. Since the data were to be compared with hourly wind values, hourly averages of each parameter estimate were taken. Straight lines have been

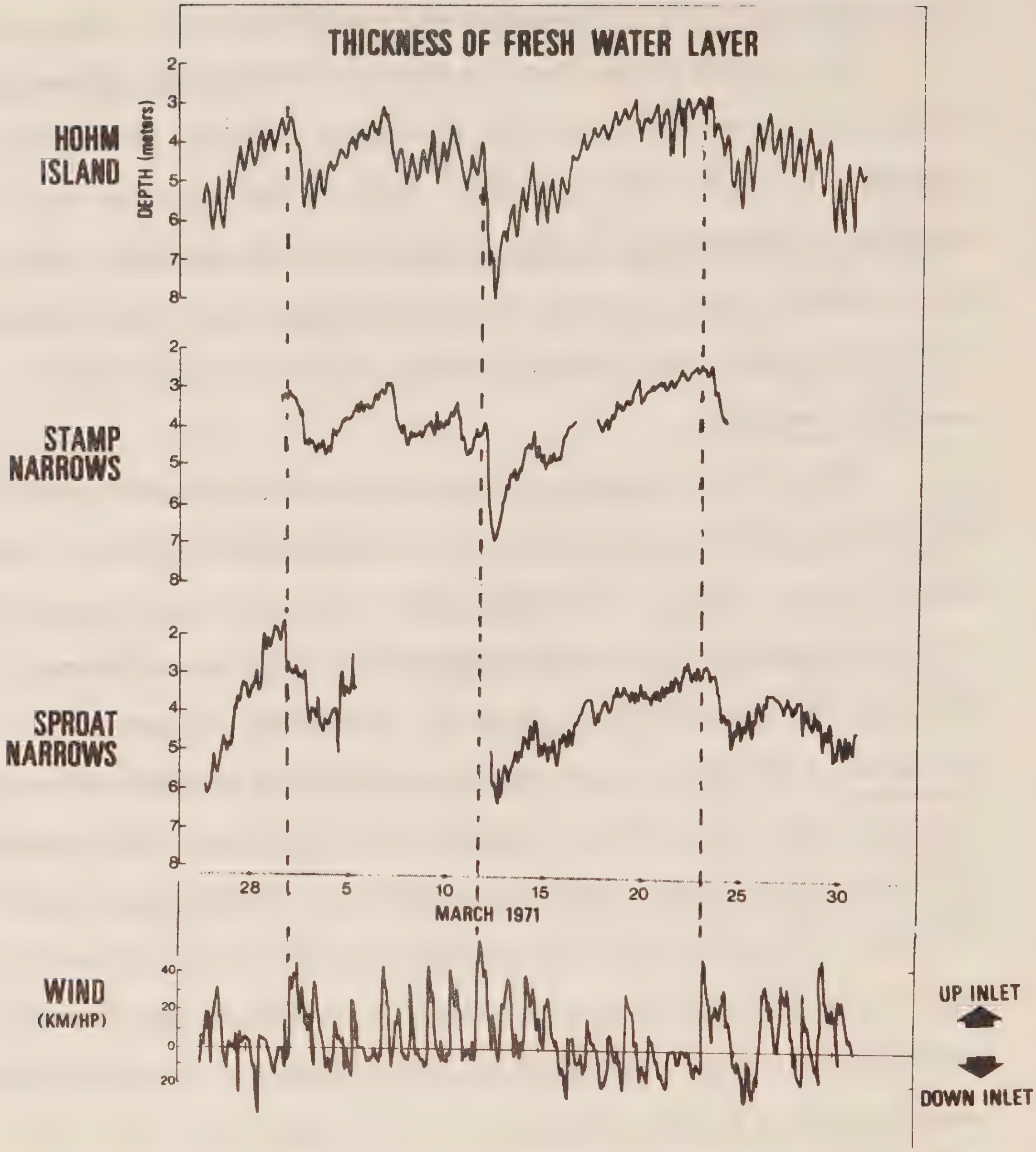


Figure 8. Thickness of Fresh Water Layer (33 days).

drawn between these hourly values in the plots presented in later sections.

Fresh Water Thickness and Potential Energy Difference

Figures 8 and 9 show Fresh Water Thickness and Potential Energy Difference data taken from the three main stations over a period of 33 days. The Hohm Island record represents the longest unbroken stretch of data obtained.

The Fresh Water Thickness appears to undergo a series of sudden increases associated with strong up-inlet winds, followed by a gradual return to equilibrium. The rapid fluctuations, especially at Hohm Island, are dominantly semi-diurnal. There is little obvious relationship between the diurnal wind component and the Fresh Water Thickness. The Potential Energy Difference variations also seem to be associated with the wind; the effect is usually greater at Stamp and Sproat Narrows than at Hohm Island.

It is not surprising that increases in the river discharge associated with heavy precipitation frequently occur at about the same time as extra strong winds. Significantly, however, even in the absence of these fluctuations, changes in H_f and ΔPE occur with strong winds.

For example Figure 8 shows that on March 2nd an increase in Fresh Water Thickness of $2\frac{1}{2}$m occurred; there was a strong up-inlet wind on that occasion but as shown in Figure 9 there was no change in river discharge. Similarly, Figure 9 shows a noticeable increase in Mixing Energy on that date, especially at Stamp and Sproat Narrows. It seems likely that most of the observed changes are a consequence of wind-stress.

To observe these processes in greater detail, consider the situation described by Figures 10 and 11. The following sequence of

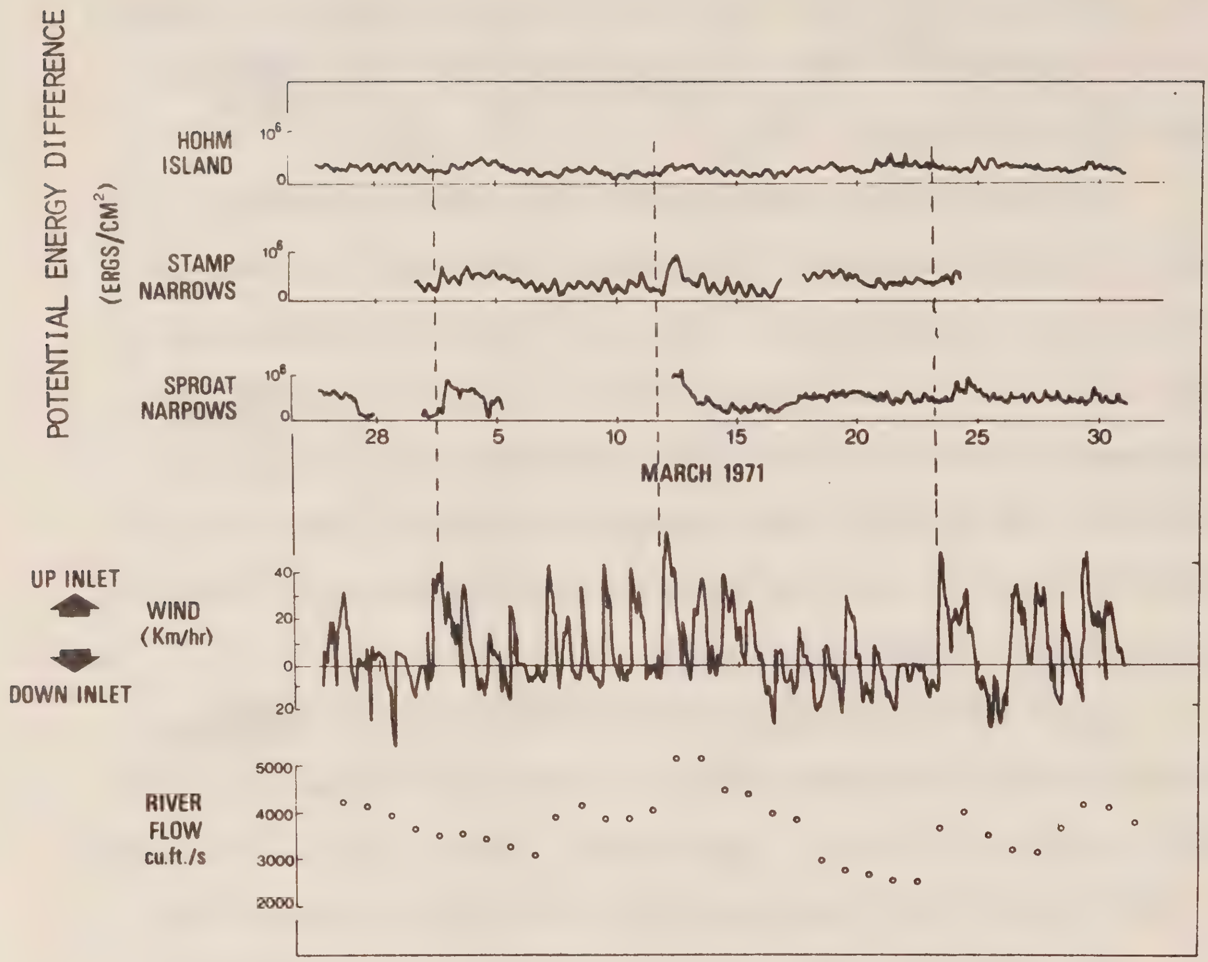


Figure 9. Potential Energy Difference, Lone Tree Point wind and Somass River discharge (33 days).

events occurred. After a period of comparative calm a strong up-inlet wind arose on February 14th. Within 3 hours the current records at 2m in Sproat Narrows responded with an up-inlet current of almost 1 knot. The Fresh Water Thickness increased suddenly, first at Hohm Island, then at Stamp Narrows and somewhat later Sproat Narrows.

Fluctuations in thickness at Hohm Island on February 15th, which may have been associated with wind-stress changes at that time, do not markedly appear at Stamp Narrows and not at all at Sproat Narrows. Moving down-inlet from the Hohm Island to the Sproat Narrows station, we see these fluctuations become progressively gentler. Moreover the greatest change of thickness between the 14th and 15th of February occurs at Hohm Island; but all three stations show similar changes during the slow return to equilibrium.

Figure 10 demonstrates another important feature common to most of the conductivity data. The internal semi-diurnal oscillation shows up most strongly at Hohm Island. It is still evident at Stamp Narrows, but only with about one half the Hohm Island amplitude. At Sproat Narrows it occasionally shows up, but at this station these fluctuations are mainly lost in the background noise.

During the pilot study in August 1970, temperature measurements taken at the float plane dock on the Eastern edge of Port Alberni harbour, across from Hohm Island, indicated essentially the same results: an internal semi-diurnal oscillation of surface thickness in phase with the surface tide. Tully (1949) also observed an internal oscillation in the harbour. It seems likely that this is an internal tide generated over the gently sloping bottom contours at the northern end of the harbour. Rattray (1959) has shown how similar topographies can cause

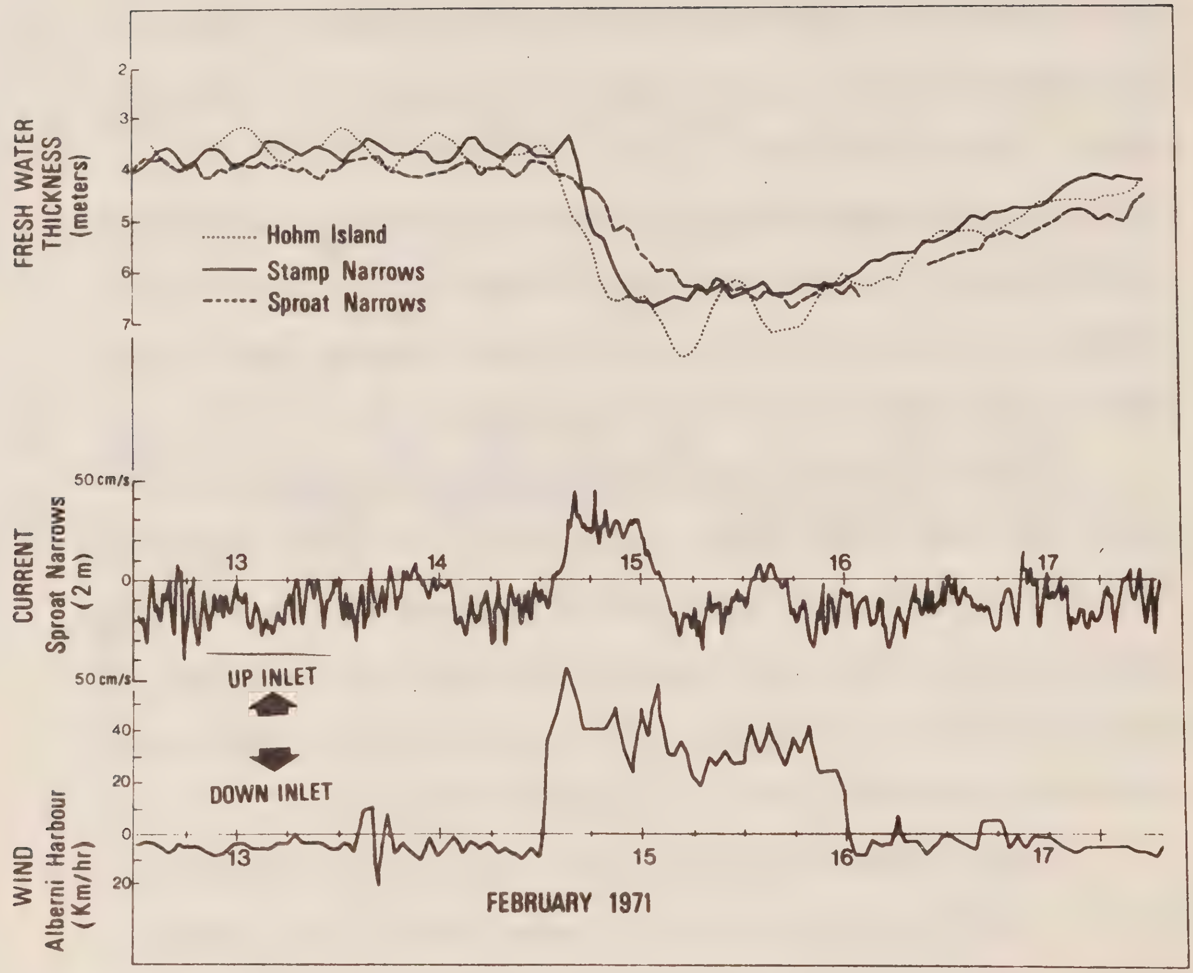


Figure 10. Fresh Water Thickness, 2m Current and Wind (5 days).

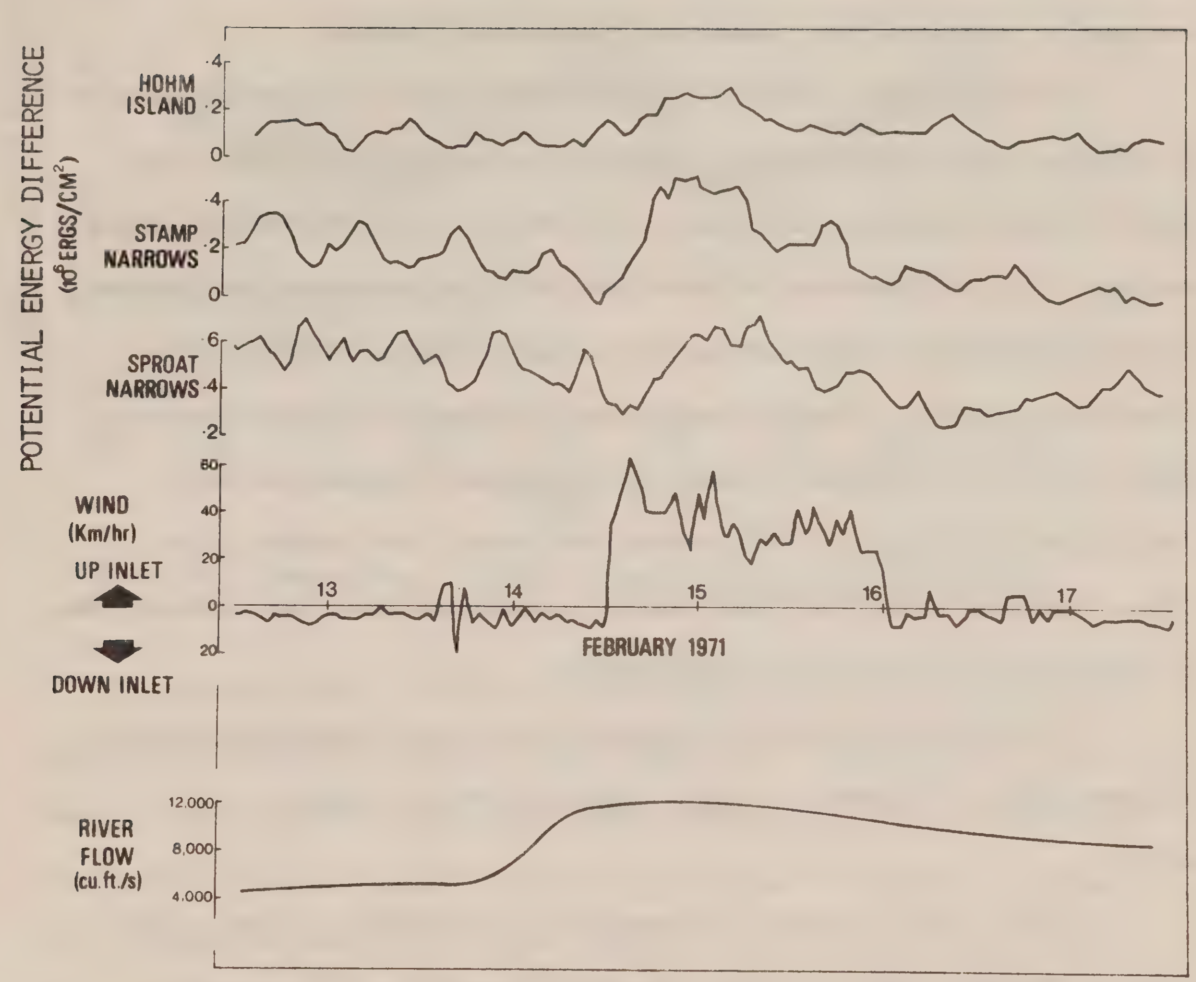


Figure 11. Potential Energy Difference, Wind Speed and Somass River discharge (5 days). The discharge curve is taken directly from the trace produced by the recording river flow guage.

internal tides on an open coast. Outside of the generating zone the disturbance can be expected to have the properties of a progressive internal gravity wave. The lower amplitude observed at Stamp Narrows presumably indicates the presence of frictional damping.

Turning now to Figure 11, we see that there is a strong increase in ΔPE when the wind picks up. Figure 11 also shows the river flow which is taken directly from the curve traced on the original discharge record. It is interesting to note that the flow increases and reaches its peak before the wind starts, but no large change in H_f or ΔPE occurs at this time. These results tend to support the hypothesis that most of the changes in these two parameters depend upon wind rather than discharge. On the other hand there does appear to be a slight decrease in ΔPE at Stamp and Sproat during the first twelve hours of February 14th, before the wind begins.

The Potential Energy Difference also shows a marked variation of semi-diurnal frequency. Tully (1949) observed a similar effect.

On May 12th I moved the conductivity profiler at Hohm Island down to the North side of Sproat Narrows (Figure 1). The purpose of this change was to search for transverse gradients in the density profile, such as might result from inertial or rotation effects. Figure 12 shows the corresponding Fresh Water Thickness records; apart from a curious discrepancy on May 17th the data is very similar.

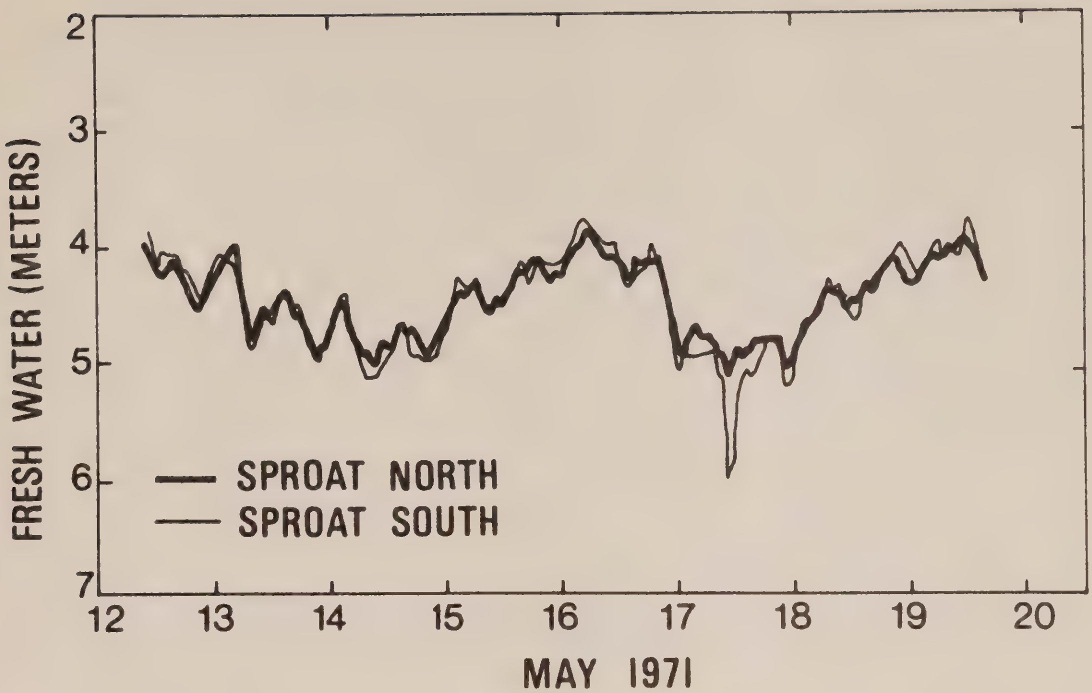


Figure 12. Comparison of Fresh Water Thickness on North and South sides of Sproat Narrows.

Between April 7 and May 11 the Stamp Narrows conductivity profiler was stationed at Spencer Creek (Figure 1). This move was made to observe wind effects in the lower part of the inlet. The records from this station are not good; the salinity gradient is rather less than in the upper reaches of the inlet and the noise level is much higher. During this period of observation winds of up to 14m/sec were recorded, but it is clear from the data, which are not presented here, that major variations in the Fresh Water Thickness are not present. On the other hand the data show quite large changes in the Potential Energy Difference associated with strong winds.

PART II

ANALYSIS AND DISCUSSION

The combined effects of wind, tide and run-off produce a dynamic condition of extraordinary complexity. Nevertheless certain important features do stand out. A striking relationship exists between surface current and wind. And from the surface layer thickness data we see that strong up-inlet winds produce a thickening which is largest at the inlet head, a distortion that takes at least two or three days to disappear.

These are phenomena that might profitably be considered separable from the other processes of inlet circulation. By this I do not mean that they are unconnected. The mechanisms of turbulent entrainment and mixing associated with estuarine circulation are highly non-linear; they undoubtedly influence and are influenced by the wind effects. But if we consider only the dominant features of the process, we may yet learn something of the physics involved while retaining a description that is analytically tractable.

Fourier Analysis of Time Series Data

When analysing long time series it is often useful to consider their frequency representation. In practice this is achieved by using such numerical techniques as the 'Fast Fourier Transform' to obtain coefficients of the Finite Fourier Series of the data. For the process X(t) sampled at 2N points spaced Δt apart where X(t) represents the deviation from the mean, the following expression defines the coefficients:

$$X(t) = \sum_{k=1}^{N} \left\{ a_k \mathrm{Cos}\ (k2\pi\Delta f \cdot t) + b_k \mathrm{Sin}(k2\pi\Delta f : t) \right\}$$

where Δf is the frequency band-width and is equal to $\frac{1}{2N\Delta t}$ and $b_N = 0$.

The second order statistic $\overline{X(t) \cdot X(t)}$, where the overbar denotes an ensemble average, is called the variance. $P(f)\Delta f$, the power spectral density, is its frequency space representation; it defines the contribution to the variance of the observed fluctuations within the band Δf. When taking the ensemble average of the product series, cross terms of the form $\mathrm{Sin}(mt) \cdot \mathrm{Cos}(nt)$ $m \neq n$ disappear, as also do terms of the form $\mathrm{Cos}(mt) \cdot \mathrm{Cos}(nt)$ and $\mathrm{Sin}(mt) \cdot \mathrm{Sin}(nt)$. We are left with the expression

$$P(f)\Delta f = \tfrac{1}{2}\left[a_k^2 + b_k^2\right] .$$

For two different processes $X(t)$ and $X'(t)$, we define the co-variance as $\overline{X(t) \cdot X'(t)}$ and in the same way find the Co-spectrum:

$$Co(f)\Delta f = \tfrac{1}{2}\left[a_k a'_k + b_k b'_k\right] ,$$

Normalisation of the co-spectrum with respect to the spectra of each variable leads to the quantity $Co \cdot (P \cdot P')^{-\frac{1}{2}}$ which represents that fraction of the observed fluctuations in each signal in phase with the other signal over the given frequency band.

Shifting one signal forward by 90° at each frequency and taking the averaged product, we can define the Quadrature Spectrum:

$$Q(f)\Delta f = \tfrac{1}{2}\left[a_k b'_k - a'_k b_k\right] .$$

Co-spectra and Quadrature spectra are extensions of the concept of correlation to a frequency representation. For instance, two signals may be perfectly related in a band but have zero co-spectrum if the fluctuations at this frequency are 90° out of phase. The normalised quadrature spectrum in this case will be equal to one.

An alternative representation for two spectra is provided by

their phase and their coherence squared. The phase spectrum is

$$\phi(f) = \text{Arctan}\left[\frac{-Q(f)}{Co(f)}\right]$$

and the Coherence Squared

$$C^2(f) = \frac{(Co(f)^2 + (Q(f)^2)}{P(f)\cdot P'(f)} .$$

In any given band the Coherence-Squared represents that fraction of the variance in one signal which is related to the other signal regardless of phase.

Finally we define the Amplitude Transfer Function

$$T(f)_{a\to b} = \sqrt{\frac{P(f)_b}{P(f)_a} \cdot C^2(f)}$$

This function corresponds to the gain of a linear system which relates the two processes a and b.

The spectra defined thus far are exact frequency representations of the data from which they are derived. This does not mean that they satisfactorily represent the process from which the data points were sampled. Averaging enables us to obtain smoother spectral estimates. In practice we may average spectral values over adjacent frequency bands, or average values from each band with the corresponding values derived from other data gathered under the same conditions, or we may use both procedures.

An artifact of the sampling is that the use of a finite length of data causes leakage into adjacent frequency bands from any given spectral band. A problem also occurs if there is any significant energy in the sampled signal at frequencies greater than $\frac{1}{2\Delta t}$, the highest for which spectral estimates can be made. In this case the high frequency

energy may appear within the frequency range of analysis, a result known as aliasing.

In this thesis I have plotted the product of frequency and spectrum against the logarithm of frequency. This has the advantage of allowing several decades of frequency to be shown while preserving area under the curve (Since $Pdf = f \cdot Pd(\ln f)$). Thus a comparison of the areas under the curve for a given band width at different frequencies provides a comparison of the contribution to the variance in each case. When plotting spectra in this way it is common to average over more coefficients at higher frequencies than at the lower end of the scale. In this case we obtain smoother results at higher frequencies: caution should be exercised in interpreting the low frequency estimates.

Chapter 4

WIND AND CURRENT

Wind and Current Spectra

Three months of almost unbroken records exist for current-meters at 2m depths on both sides of Sproat Narrows. Hourly wind data also exist throughout this period. Figure 13 shows spectra computed for hourly averaged current records taken on both sides of the inlet at Sproat Narrows, and also for the quantity $U|U|$ derived from the records of the wind-speed U at Lone Tree Point. If a square law holds for the relationship between wind-speed and stress, then $U|U|$ should be proportional to the stress over the water.

A prominent peak centered on the diurnal frequency dominates the wind-stress spectrum. There is also some energy in the bands of periodicity 4 and 8 days. The two current spectra are very similar to each other with the instrument on the South side of Sproat Narrows recording slightly more energy in nearly all bands. Again there is a strong diurnal signal with a smaller peak at four days; the spectrum falls off rapidly at lower frequencies.

With current records derived from instruments on each side of the inlet, a simple test provides a means of determining the way in which current fluctuations occurring on one side are related to those on the other side. Figure 14 shows coherence and phase found from spectral calculations of each record. Apart from a curious exception at a periodicity of 346 hours at which the North Sproat record leads the South by 24°, both data sets are essentially in phase and are highly

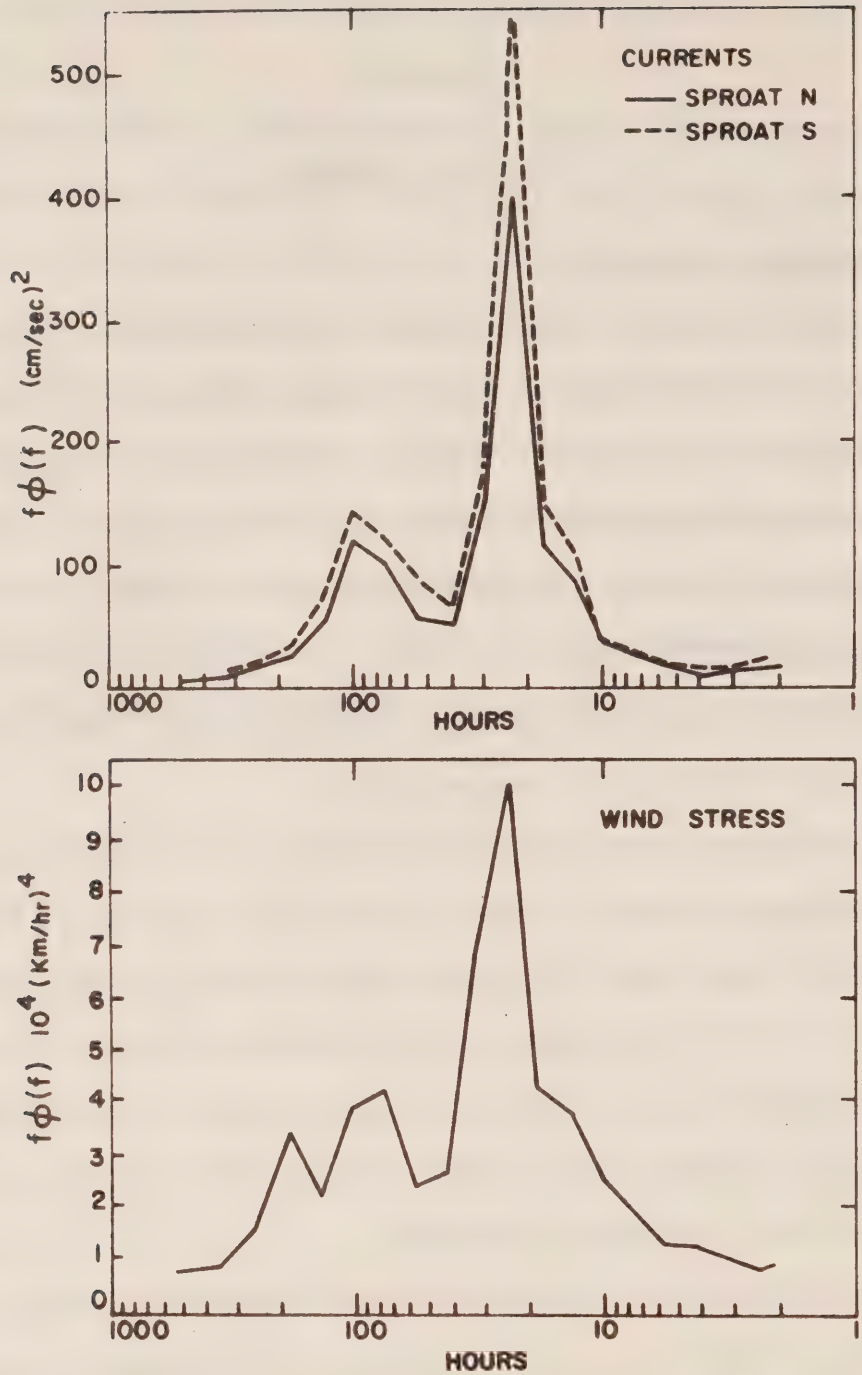


Figure 13. Spectra of 2m current at Sproat Narrows and U|U|, assumed proportional to Wind-Stress, at Lone Tree Point.

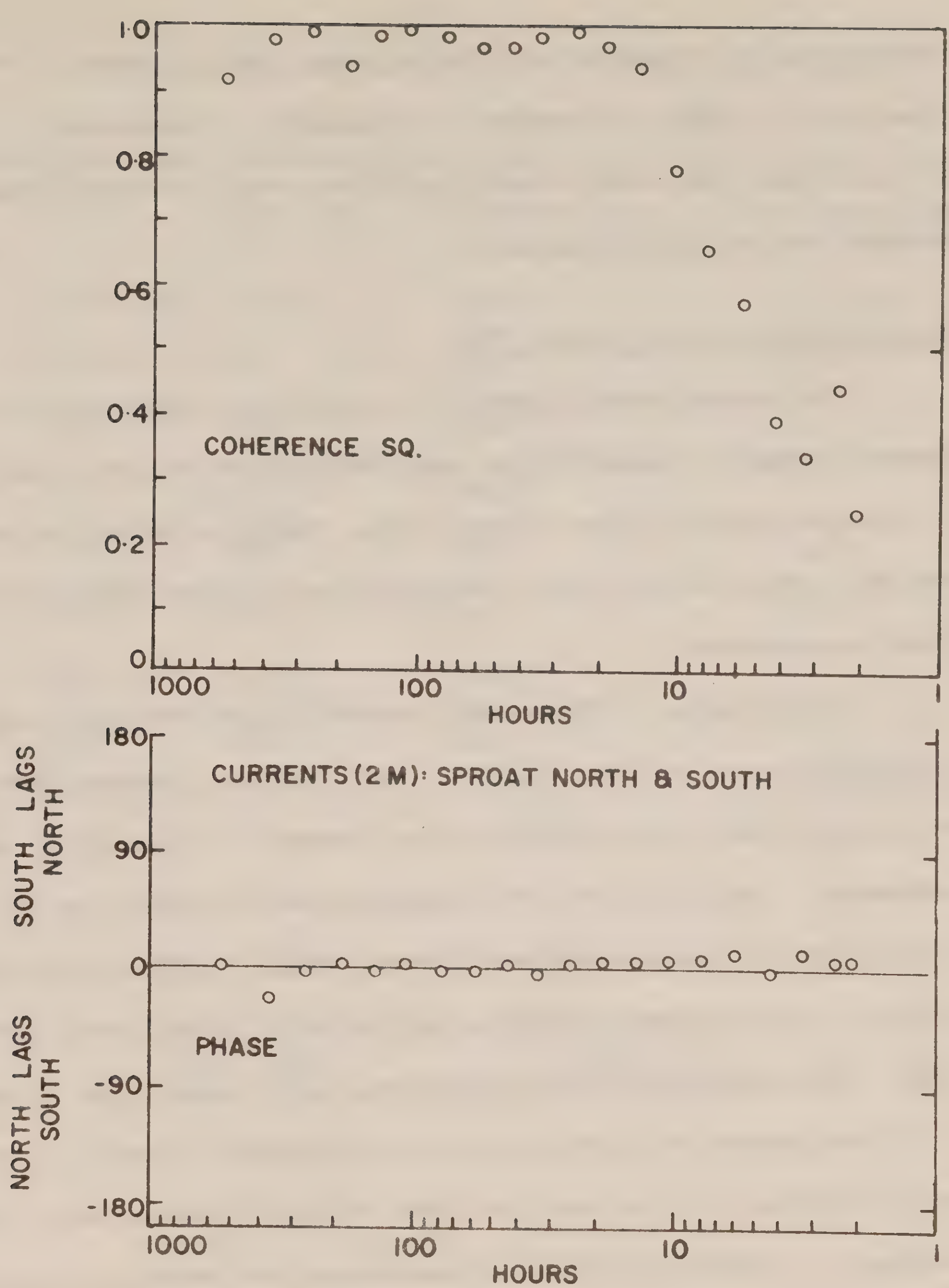


Figure 14. Coherence Squared and Phase between 2m current on North and South side of Sproat Narrows.

coherent for all fluctuations greater than about 6 hours. Loss of coherence at higher frequencies is presumably a consequence of eddies in the stream flow being significantly narrower than the distance between the two current-meters.

Wind Effects and the Diurnal Tide

The strong energy peaks in the wind and current spectra at the diurnal frequency suggest close coupling between the two. Yet 24 hours is also the period of the diurnal tide. Before relating the wind and the current we must first estimate the relative importance of the tidal contribution.

The Canadian Hydrographic Service has derived tidal constituents from a one year record at Port Alberni. Values from Tofino on the coast are also available as an average of 17 years of annual estimates. Table II shows constituents from both locations for the more important diurnal and semi-diurnal tides, together with certain ratios. In both places tides are of the mixed, semidiurnal dominant type. The amplitudes are very similar; the M_2 constituent is one tenth of a foot greater at Tofino than at Port Alberni. Clearly, the inlet has no resonant surface mode response at these frequencies. This feature is consistent with Murty and Boilard's (1969) numerical prediction that seiche action only occurs at periods less than 2½ hours.

If we can assume that the ratio between two different tidal height constituents multiplied by the ratio of their respective frequencies is similar to that between the corresponding tidal currents, then it is possible to make some estimate of the relative contributions of wind and tide to energy in different bands of the current spectrum.

Table II

Tidal Amplitudes and Ratios at Port Alberni and Tofino

Tide	Period	Tofino Amp		Pt. Alberni Amp		Pt. Alberni $(Amp)^2$
Q_1	26.87 hrs	.144 ft		.140 ft		.02 ft^2
O_1	25.82	.803		.809		.66
P_1	24.07	.398	1.673	.400	1.700	2.89
K_1	23.93	1.275		1.300		
N_2	12.91	.658		.665		.44
M_2	12.42	3.248		3.128		9.79
S_2	12.00	.927	1.180	.876	1.123	1.26
K_2	11.97	.253		.247		

Ratio of Tidal Energy at Port Alberni

Tidal Ratio	$(Amp)^2$
$(P_1 + K_1)/O_1$	4.41
$(P_1 + K_1)/M_2$	.29

This assumption is likely to be good provided that the frequencies are close to each other, and yet distant from any natural frequencies in the inlet. We have seen that no surface mode resonance occurs at these frequencies; there remains the possibility of natural internal oscillations. If these do occur, however, they will be at much lower frequencies than the diurnal tide; they will also have broad energy bands reflecting the changing nature of the density structure.

Separation of the closely spaced tidal constituents requires a narrow bandwidth analysis. With the data available it is not possible to separate the P_1 and K_1 or the S_2 and K_2 tides. But we can separate the O_1 from the $(P_1 + K_1)$ band and the M_2 from the $(S_2 + K_2)$ band. Figure 15 shows the relevant parts of the current spectrum, together with a schematic representation of the relative energy of the tidal constituents shown in Table 2.

The tidal height energy associated with each tide has been assumed to be proportional to the square of the respective constituent. In the case of two constituents falling within the same frequency band I have taken the square of the sum. This value represents the energy that would appear if both components were in phase and should therefore be regarded as an upper limit.

Since the tidal current is proportional to the derivative of the tidal height with respect to time, we must multiply the tidal constituents by the frequency f (and thus multiply the squared constituents by f^2). The current spectrum in Figure 15 is a plot of $f\phi(f)$ against log f using a constant band-width Δf. We therefore multiply the squared constituents again by the frequency in order to make the ratios comparable. The comparison will thus be between ratios of $(\text{tidal amplitude})^2 \cdot f^3$

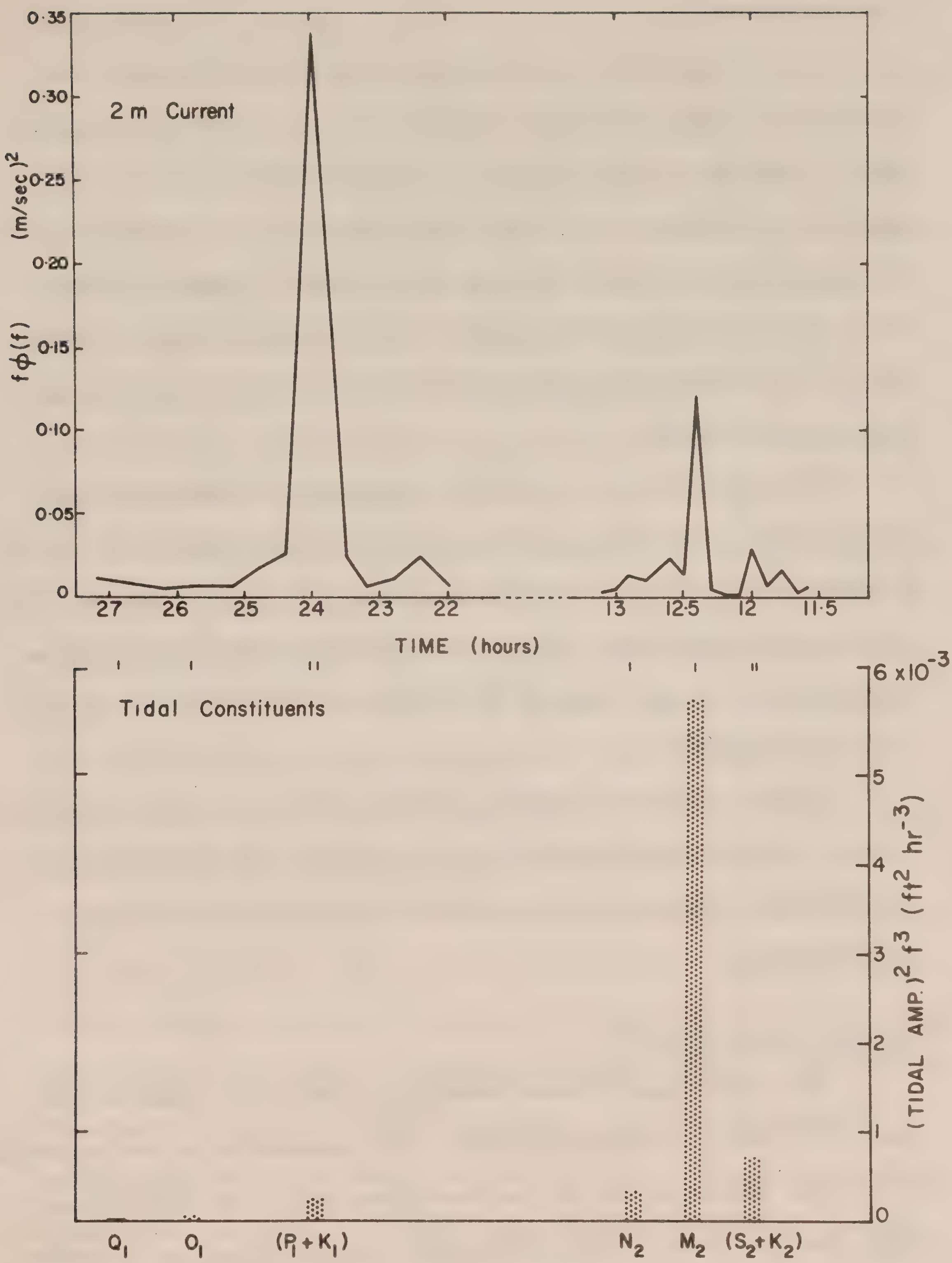


Figure 15. Spectrum of 2m current at Sproat Narrows (South), and Tidal Constituents squared. The tidal constituents represent the amplitude of the tidal height derived from one year's data at Port Alberni.

with ratios of $f\phi(f)$.

A striking feature of the spectrum in Figure 15 is the disproportionate amount of current energy at the $(P_1 + K_1)$ band. If the spectral peak were representative of the tidal energy alone we would expect it to be at most 4.4 times the signal at the O_1 frequency. Yet the spectrum gives a value 45 times the O_1 signal. Indeed, neither the O_1 nor the Q_1 bands show up above the background noise. Evidently the $(P_1 + K_1)$ band has at least ten times as much energy as the tides alone can contribute.

Now consider the semi-diurnal frequencies. Background noise obscures the N_2 tide, but the $(S_2 + K_2)$ band shows a small peak and the M_2 band dominates this part of the spectrum. The spectral values of the current show about eighty times as much energy at the diurnal peak as we would expect on the basis of the M_2 and $(P_1 + K_1)$ ratio of squared tidal constituents.

These comparisons clearly show that tides alone cannot account for the strong 24 hour component in the currents. We must attribute the difference to another diurnal factor; this is almost certainly the wind-stress.

The Wind Driven Current

The mountainous terrain bordering Alberni Inlet confines the wind to the inlet's longitudinal axis. The topography in turn constrains the surface waters to move in the same direction as the wind-stress. Since the inlet head is a solid boundary a wind 'set-up' or 'set-down' will soon occur. Thus a pressure gradient develops in the water along the inlet in opposition to the wind-stress. Fluctuations in the wind-stress will cause fluctuations in the wind set-up which produces changes

in the pressure gradient; these changes propagate back down the channel as surface gravity waves.

Baroclinic effects are also present, of course; their discussion follows in a later section. But to a depth of 2 meters at least, we expect current fluctuations to be governed mainly by changes in the wind-stress and barotropic pressure gradients. In this surface layer turbulent processes will diffuse momentum imparted via the surface down through the water column. The momentum transfer may not be instantaneous; in this event a finite, measurable time will elapse between a change in wind-stress at the surface and the corresponding change in velocity at 2 meters.

There is also a time interval associated with the propagation of pressure gradient changes from the inlet head to the point of measurement which depends upon the surface gravity wave speed. For Sproat Narrows this will be about 10 minutes. When the wind-stress fluctuations have a period long compared to this transit time, yet not too close to any natural frequencies of the basin, we expect wind-stress and pressure gradient to be nearly 180° out of phase.

Figure 16 shows phase and coherence plots for the wind-stress and 2 meter current at Sproat South. The coherence drops off rather quickly for periods shorter than about 20 hours. Apart from the highest frequency band analysed, the phase angle changes almost logarithmically throughout the range. At high frequencies the wind precedes the current, but for oscillations of about 60 hours both wind and current appear to be in phase. At still lower frequencies the wind actually lags the current.

This last finding is at variance with the arguments made above

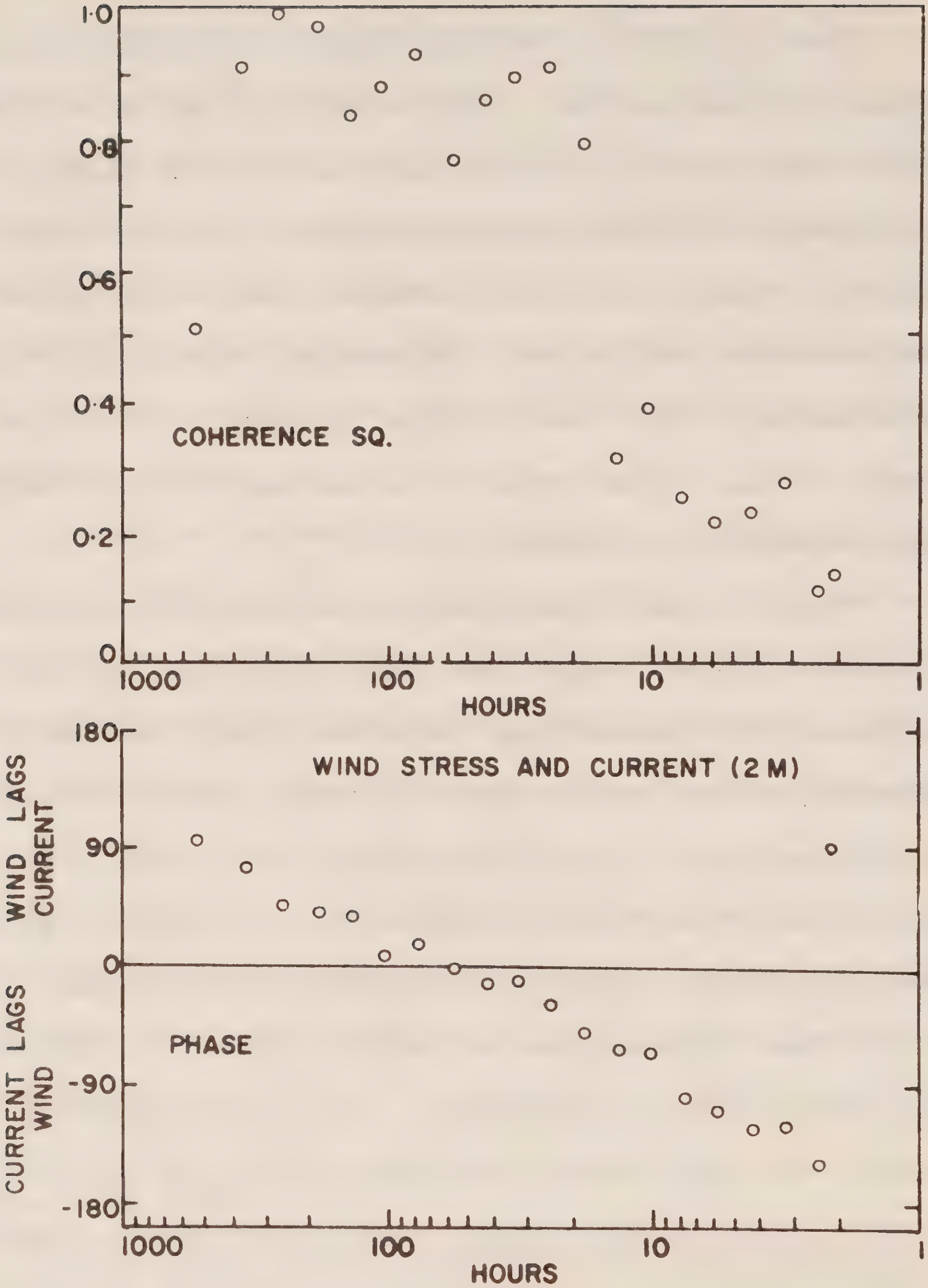


Figure 16. Coherence Squared and Phase between 2m current at Sproat Narrows and Wind-Stress derived from Lone Tree Point wind records.

concerning the relation between changes in wind-stress and current. One possible mechanism that could explain this result is the generation of long surface gravity waves by meteorological disturbances off the coast. Readjustment of the density field within the surface layer at longer time scales will also occur. Variations in river discharge will influence the spectra and may be partly responsible for the positive phase at low frequencies.

For higher frequencies we may translate the discussion of vertical momentum transfer into a simple model for deriving diffusion coefficients from observed phase angles. Eddy viscosity is a poor representation of turbulent processes, but in the absence of more appropriate data it is also the only one available. If the pressure gradient changes are independent of depth and 180^{o} out of phase with the wind-stress, they will change the amplitude of the wind-driven current, but not its phase angle. We may therefore solve the diffusion equation for U_w, that part of the velocity induced directly by wind-stress, but excluding the pressure gradient effect, in order to find the phase angle between wind and current.

For an average kinematic eddy viscosity ν_ε, the linearised equation of motion is

$$\nu_\varepsilon \frac{\partial^2 U_w}{\partial z^2} - \frac{\partial U_w}{\partial t} = 0$$

A solution decreasing with depth for the periodic surface condition $U_w = Ae^{i\omega t}$, is

$$U_w = Ae^{-z\{\omega/2\nu_\varepsilon\}^{\frac{1}{2}}} \cdot e^{i(\omega t - z\{\omega/2\nu_\varepsilon\}^{\frac{1}{2}})}$$

This yields a phase angle between wind and current of $\phi = z\left[\omega/2\nu_\varepsilon\right]^{\frac{1}{2}}$

In particular, $\nu_\varepsilon = \omega z^2/2\phi^2$ (4.1)

Table III shows values of ν_ε found from measured phase angles using equation (4.1) for periodicities of 43 hours and less, together with the amplitude of the wind component. At lower frequencies the phase relation cannot be used in this way, for as we have seen above, we may no longer consider the current fluctuations to be purely wind driven. A further complication occurs in the highest frequency band analysed. Here also the current appears to precede the wind and I have excluded it from the viscosity calculations. This spurious result may be due to the presence of a surface seiche; Murty and Boilard (1969) predict a first mode natural frequency for the Alberni Inlet--Trevor Channel system just 2% lower than the center of this band, at 2.096 hours.

Apart from this exception, values for periodicities less than 24 hours fall remarkably close to 2 cm^2sec^{-1}. The apparent eddy viscosity is slightly greater for 24 hours, a result that may be due to higher wind speed, and thus more turbulence, in this band. Such arguments cannot hold however for the 32 and 43 hour bands; perhaps these values represent a balance between realistic calculations and contamination of the data with current fluctuations that are not wind driven, of the type discussed earlier. In any event, the results indicate that a kinematic eddy coefficient in the range 1 to 10 cm^2sec^{-1} is certainly consistent with the observations.

Table III

Coefficient of Kinematic Eddy Viscosity, ν_ε

Period	Wind Speed Amplitude	ν_ε
43.0 Hrs	1.60 m/sec	9.3 cm^2/sec
32.4	2.65	13.9
24.3	3.79	5.0
18.3	2.06	2.3
13.7	1.91	1.9
10.23	1.61	2.4
7.69	1.45	1.3
5.78	1.25	1.9
4.33	1.11	1.9
3.24	.95	2.5
2.43	.84	1.1

Chapter 5

SURFACE LAYER THICKNESS

Certain features of the surface thickness are of special importance in trying to understand the response of the stratification to wind-stress. The first result is that strong up-inlet winds cause a sudden thickening of the surface layer at the inlet head. Secondly, this distortion takes at least two or three days to disappear. The effect also occurs away from the head, but here the disturbance is attenuated and appears to arrive slightly later.

Figure 17 shows spectra of the wind-stress and the Hohm Island surface layer thickness data; both data sets were for the total period shown in Figure 8. Coherence and phase plots in Figure 18 show a fairly high coherence for lower than semi-diurnal frequencies and a phase angle that tends to increase with frequency. The spectra in particular demonstrate another remarkable feature of the surface thickness data: despite the strong diurnal wind signal, most of the surface thickness energy is at lower than diurnal frequencies. There is a strong peak at 12 hours, but this is the internal M_2 tide and unassociated with the wind. If we are to seek a cause and effect relationship between wind and surface layer thickness, we must assume either that the coupling is more efficient at lower frequencies, or alternatively that there is a strongly non-linear process that transfers energy down the frequency scale.

The observations suggest a wind effect very similar to the response of a heavily damped mechanical system. If strong frictional

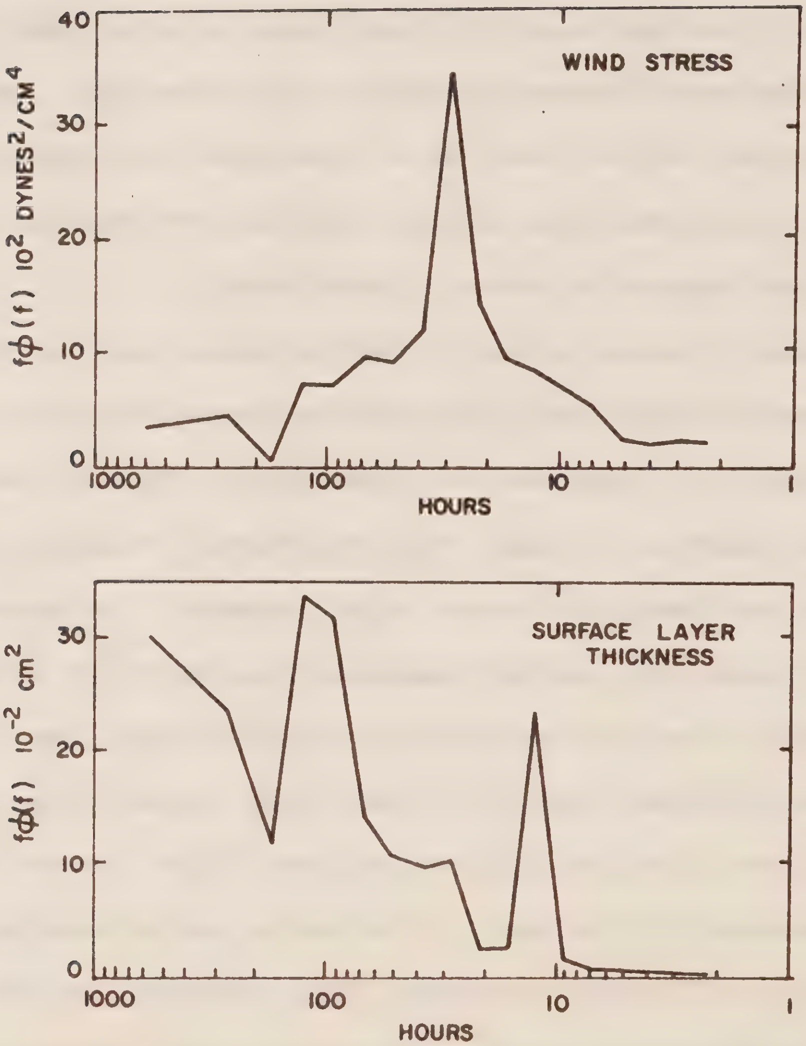


Figure 17. Spectra of wind-stress derived from Lone Tree Point wind records and surface layer thickness at Hohm Island for the 33 day period shown in Figure 8.

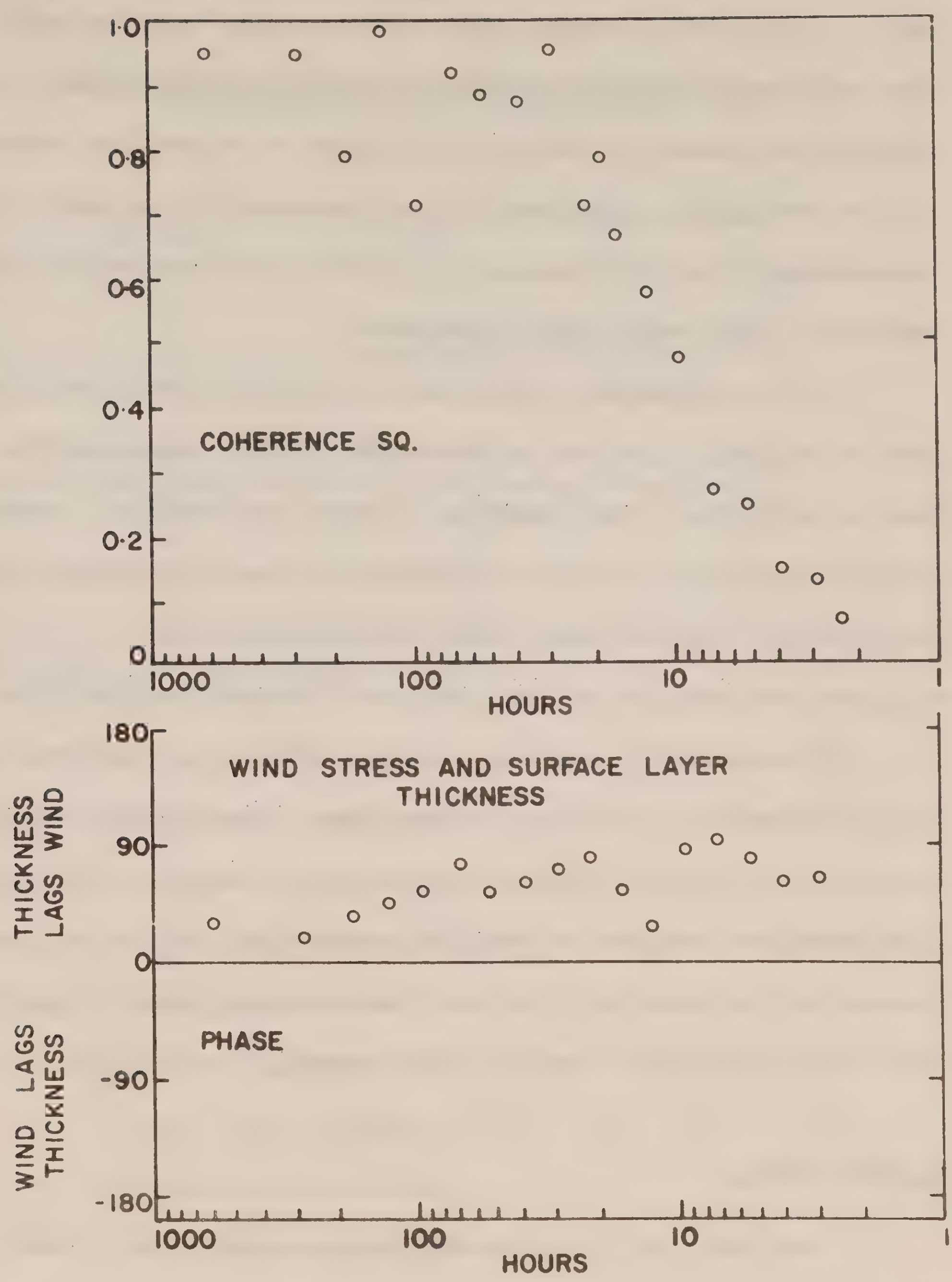


Figure 18. Coherence Squared and Phase for wind-stress (Lone Tree Point) and Fresh Water Thickness (Hohm Island).

damping is present, internal effects originating near the mouth of the inlet will have almost disappeared by the time they approach the head. In the upper reaches of the inlet at least, we expect the response to be an end effect, dominated by the character of the wind and by the consequences of a solid boundary. A simple two-layer model offers an opportunity for testing this hypothesis.

It is a remarkable fact that the steady state fjord circulation tends to maintain a fairly uniform surface layer thickness from the head to the mouth. This condition favours the two-layer representation. On the other hand the density difference between the layers diminishes progressively from the head to the mouth of the inlet; for this reason we expect the model to be less realistic further down the inlet.

The model will exclude rotation effects; as indicated earlier the instrumentation could not detect them. A more drastic simplification is the neglect of the steady state circulation. Yet it is the time-dependent response to changing wind-stress that is at issue; the success of the model will indicate the extent to which we may consider this effect separable from the other processes occurring in the inlet.

A Linear Model

Let the inlet be approximated by a semi-infinite canal of uniform depth and width consisting of two homogeneous layers of slightly different density (Figure 19). We shall formulate the hydrodynamic equations in terms of the integrated currents in each layer and solve the 'normal mode' version of these equations to obtain an expression for the motion of the interface. The following notation will apply

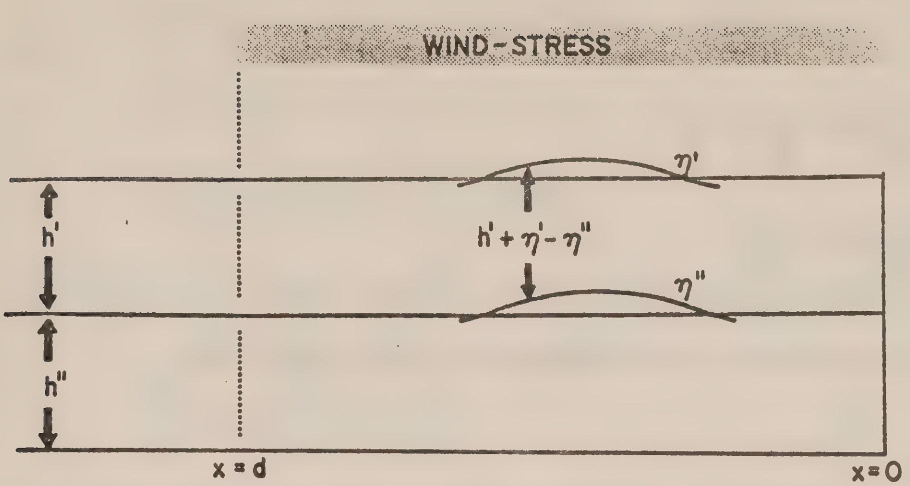


Figure 19. Two layer model of inlet.

h'	surface layer thickness
h''	lower layer thickness
h =	$h' + h''$
u'	upper layer velocity
u''	lower layer velocity
U'	upper layer transport
U''	lower layer transport
η'	surface displacement
η''	interface displacement
τ'	horizontal component of kinematic stress in surface layer
τ''	horizontal component of kinematic stress in lower layer
$\Delta\rho/\rho''$	relative density difference

The linearised equations of motion and continuity are then

$$\frac{\partial u'}{\partial t} = -g\,\frac{\partial \eta'}{\partial x} + \frac{\partial \tau'}{\partial z}$$

$$\frac{\partial u''}{\partial t} = -g(1-\frac{\Delta\rho}{\rho''})\frac{\partial \eta'}{\partial x} - g\frac{\Delta\rho}{\rho''}\frac{\partial \eta''}{\partial x} + \frac{\partial \tau''}{\partial z}$$

$$\frac{\partial (h'u')}{\partial x} = \frac{\partial \eta''}{\partial t} - \frac{\partial \eta'}{\partial t}$$

$$\frac{\partial (h''u'')}{\partial x} = -\frac{\partial \eta''}{\partial t} .$$

Integrating vertically, the transports in each layer are:

$$U' = \int_o^{h'} u'dz$$

$$U'' = \int_{-h''}^{o} u''dz$$

and the integrated equations become

$$\left.\begin{aligned} \frac{\partial U'}{\partial t} &= -gh'\frac{\partial \eta'}{\partial x} + (\tau_1-\tau_2) \\ \frac{\partial U''}{\partial t} &= -gh''(1-\frac{\Delta\rho}{\rho''})\frac{\partial \eta'}{\partial x} - gh''\frac{\Delta\rho}{\rho''}\frac{\partial \eta''}{\partial x} + (\tau_2-\tau_3) \end{aligned}\right\} \qquad (5.1)$$

$$\frac{\partial U'}{\partial x} = \frac{\partial \eta''}{\partial t} - \frac{\partial \eta'}{\partial t}$$

$$\frac{\partial U''}{\partial x} = - \frac{\partial \eta''}{\partial t}$$

where τ_1, τ_2 and τ_3 represent the kinematic stress at the free surface, interface and bottom respectively.

Rattray (1964) has devised a convenient transformation of these equations which allows the separation of surface and internal modes into an equation applicable for either type. This is accomplished by the following change of variable, to the lowest order in $\frac{\Delta\rho}{\rho''}$:

$$U_1 = U' + U''$$

$$U_2 = \frac{h''}{h} U' - \frac{h'}{h} U''$$

$$T_1 = \tau_1 - \tau_3$$

$$T_2 = \frac{h''}{h} (\tau_1 - \tau_2) - \frac{h'}{h} (\tau_2 - \tau_3) .$$

Substitution of these variables into the integrated equations yields:

$$\frac{\partial^2 U_i}{\partial t^2} = c_i^2 \frac{\partial^2 U_i}{\partial x^2} + \frac{\partial T_i}{\partial t} . \tag{5.2}$$

The surface mode, indicated by subscript "1", has the gravity wave velocity $c_1 = \sqrt{gh}$; subscript "2" denotes the internal mode with $c_2 = \sqrt{g \frac{\Delta\rho}{\rho''} \frac{h'h''}{h}}$.

The model will include internal friction under the assumption that the stress at the interface depends upon shear; in particular, on the difference between the mean velocity in each layer. Allowance for friction effects along the bottom and sides of the inlet can be made by including in the surface and bottom stress expressions, terms proportional to the transport in each layer.

Let p and q be the external and internal friction coefficients. The kinematic stress terms then become

$$\tau_1 = W - pU'$$

$$\tau_2 = q\left(\frac{1}{h'}U' - \frac{1}{h''}U''\right)$$

$$\tau_3 = pU''$$

where W is the kinematic wind-stress and p and q are of dimensions $[T^{-1}]$ and $[LT^{-1}]$ respectively. Substitution of these into the Normal Mode stress terms gives:

$$T_1 = W - pU_1$$

$$T_2 = \frac{h''}{h} W - (p+q\frac{h}{h'h''})U_2$$

$$= \frac{h''}{h} W - KU_2$$

where K is a frictional coefficient for the Internal Mode of motion and has dimension $[T^{-1}]$.

Dropping the subscript "2" and letting $T_w = \frac{h''}{h} W$, the internal mode equation (5.2) finally becomes:

$$\frac{\partial^2 U}{\partial t^2} = c^2\frac{\partial^2 U}{\partial x^2} + \frac{\partial}{\partial t}\left[T_w - KU\right]. \tag{5.3}$$

Having solved for U, the term $(\eta''-\eta') = \eta$ representing departure of the surface layer thickness from equilibrium, can be recovered from equations (5.1):

$$\frac{\partial U_2}{\partial t} = c^2\frac{\partial}{\partial x}(\eta''-\eta') + T_2$$

or $$(\eta''-\eta') = \eta = \frac{1}{c^2}\int_0^x \frac{\partial U_2}{\partial t}\,dx - \frac{1}{c^2}\int_0^x T_2 dx \tag{5.4}$$

Solving the Equation

Equation (5.3) has the form of a mixed Heat and Wave equation. First consider free wave solutions of the form $U = e^{-i(kx+\omega t)}$ where ω is complex and k is real corresponding to waves whose wave number is fixed. The dispersion relation is

$$\omega^2 + iK\omega - c^2k^2 = 0$$

with the roots

$$\omega = -\frac{iK}{2} \pm \tfrac{1}{2}\sqrt{-K^2+4c^2k^2}\ .$$

Wave solutions are possible provided $4c^2k^2>K^2$, that is, for wavelengths λ such that

$$\lambda < \frac{4\pi c}{K} \tag{5.5}$$

The phase velocity is $c\sqrt{1-\frac{K^2}{4c^2k^2}}$. Its value increases to a maximum of c with increasing wave number: the waves are anomalously dispersive. We may also solve the dispersion relation for complex k. The coefficient defining exponential decay with distance is then the imaginary part of the root

$$k = -\frac{1}{c}\sqrt{\omega^2+iK\omega}$$

This complex root can be rewritten as

$$k = \frac{1}{c}\{r^{\frac{1}{2}}\mathrm{Cos}\tfrac{1}{2}\theta+ir^{\frac{1}{2}}\mathrm{Sin}^{\frac{1}{2}}\theta\}$$

where the modulus $r = \sqrt{\omega^4+\omega^2K^2}$ and the argument $\theta = \mathrm{Tan}^{-1}\left(\frac{K}{\omega}\right)$. The decay of waves with distance is therefore of the form

$$\exp\ \{-\frac{x}{c}(\omega^4+\omega^2K^2)^{\frac{1}{4}}\mathrm{Sin}(\tfrac{1}{2}\mathrm{Tan}^{-1}\left(\frac{K}{\omega}\right)\}\} \tag{5.6}$$

For forced wave solutions consider a uniform wind-stress extending from the inlet head, x = 0, to a point x = d further down the inlet. In this way the stress will approximate winds in Alberni Inlet that typically occur between Spencer Creek and the inlet head. At d we

match the transports in each layer and the surface layer thickness. Finally U is set equal to zero at the inlet head and for $x = \infty$.

The boundary and initial conditions are therefore as follows:

$U = 0$ at $x = 0$

$U = 0$ at $x = \infty$

U is piecewise continuous through $x = d$

η is piecewise continuous through $x = d$

$U = 0$, $U_t = 0$ at $t = 0$

$T_w = T_w(t) \qquad x \leq d$

$T_w = 0 \qquad x > d$.

For the inner region over which the wind acts, the Laplace Transform of equation (5.3) is

$$\frac{d^2\overline{U}}{dx^2} - \gamma^2\overline{U} = -\frac{s}{c^2}\,\overline{T}_w \tag{5.7}$$

where $\gamma = \frac{1}{c}\sqrt{s^2 + Ks}$ and the Laplace Transform of P(x,t), indicated by an overbar, is defined by

$$\overline{P}(x,s) = \int_0^\infty e^{-st}P(x,t)dt\,.$$

A solution to (5.7) is

$$\overline{U} = C_1e^{\gamma x} + C_2e^{-\gamma x} + \frac{1}{s+K}\cdot\overline{T}_w\,.$$

Applying the boundary condition at $x = 0$

$$\overline{U} = -C_2e^{\gamma x} - \frac{1}{s+K}\,\overline{T}_we^{\gamma x} + C_2e^{-\gamma x} + \frac{1}{s+K}\,\overline{T}_w\,.$$

Similarly, the solution in the outer region, after applying the condition at $x \to \infty$, is

$$\overline{U} = D_2 e^{-\gamma x} .$$

At d we match the transports:

$$-C_2 e^{\gamma d} - \frac{1}{s+K}\,\overline{T}_w\, e^{\gamma d} + C_2 e^{-\gamma d} + \frac{1}{s+K}\,\overline{T}_w = D_2 e^{-\gamma d}$$

and the layer thickness, using (5.4):

$$-C_2 e^{\gamma d} - \frac{1}{s+K}\,\overline{T}_w e^{\gamma d} - C_2 e^{-\gamma d} = -D_2 e^{-\gamma d} .$$

Solving for the constants C_2 and D_2 gives

$$C_2 = \frac{1}{s+K}\,\overline{T}_w \{\tfrac{1}{2} e^{-\gamma d} - 1\}$$

$$D_2 = \frac{1}{s+K}\,\overline{T}_w \{\tfrac{1}{2} e^{\gamma d} + \tfrac{1}{2} e^{-\gamma d} - 1\}$$

yielding the solutions

$$\overline{U} = \frac{1}{s+K}\,\overline{T}_w \{-e^{-\gamma x} + \tfrac{1}{2} e^{-\gamma d} e^{-\gamma x} - \tfrac{1}{2} e^{-\gamma d} e^{\gamma x} + 1\} \qquad 0 \leq x \leq d$$

$$\overline{U} = \frac{1}{s+K}\,\overline{T}_w \{\tfrac{1}{2} e^{\gamma d} + \tfrac{1}{2} e^{-\gamma d} - 1\}\, e^{-\gamma x} \qquad x \geq d ,$$

Restricting attention now to the inner region, equation (5.4) enables us to write the solution in terms of the surface layer thickness

$$\overline{\eta} = \frac{1}{c_2}\,\overline{T}_w \{\frac{1}{\gamma} e^{-\gamma x} - \frac{1}{2\gamma} e^{-\gamma(d+x)} - \frac{1}{2\gamma} e^{-\gamma(d-x)}\} \qquad x \leq d ,$$

Finally, inverting the Laplace Transform (Abramowitz and Stegun, 1965, p. 1027) and applying the convolution theorem:

$$\eta(x,t) = \frac{1}{c}\int_0^t T_w(t-\tau)e^{-\frac{K\tau}{2}}\left(I_o\left[\frac{K}{2}\sqrt{\tau^2-\frac{x^2}{c^2}}\right]H\left[\tau-\frac{x}{c}\right]\right.$$

$$-\tfrac{1}{2}I_o\left[\frac{K}{2}\sqrt{\tau^2-\frac{(x+d)^2}{c^2}}\right]H\left[\tau-\frac{[x+d]}{c}\right]$$

$$\left.-\tfrac{1}{2}I_o\left[\frac{K}{2}\sqrt{\tau^2-\frac{(d-x)^2}{c^2}}\right]H\left[\tau-\frac{(d-x)}{c}\right]\right)d\tau \qquad x \leq d \tag{5.8}$$

where I_o is the zero order modified Bessel Function and H is the Heaviside unit step function:

$$H(t) = 0 \quad t < 0$$
$$= 1 \quad t \geq 0 .$$

The case of zero friction (K=0) is instructive. Let the wind-stress be of the form

$$T_w(t) = T \quad 0 \leq t \leq t_1,\ t_1 < \frac{d}{c}$$

$$T_w(t) = 0 \quad t > t_1 \quad \text{and} \quad t < 0 \tag{5.9}$$

where T is a constant. Integrating (5.8) for x = 0 gives:

$$\eta(0,t) = \frac{1}{c}T\{t-(t-t_1)H(t-t_1)-(t-\frac{d}{c})H(t-\frac{d}{c})+(t-\frac{d}{c}-t_1)H(t-\frac{d}{c}-t_1)\}.$$

The first term reflects a constant rate of decrease in surface layer thickness for a down-inlet wind, or increase for an up-inlet wind. This effect persists until the wind stops at $t = t_1$ when the second term appears and the thickness remains constant. The return to equilibrium starts when the wave emanating from point d, referred to as the End Wave, reaches the inlet head, and finishes with the fourth term representing the termination of the End Wave.

Figure 20 shows solutions numerically evaluated for different $\tilde{K} = \frac{1}{2}Kt_1$, for the case $\frac{d}{c} = 2t_1$, and indicates the way in which friction influences the solution. The maximum displacement is reduced, the return to equilibrium begins as soon as the wind ceases, but is not complete with the termination of the End Wave and thereafter approaches zero only gradually with increasing time.

As the time taken for the End Wave to reach the inlet head increases its contribution diminishes and for sufficiently large values of $\frac{d}{c}$ it can be neglected altogether. In this case we may drop the second and third terms of (5.8); integration for a wind-stress of form (5.9) then yields the solution:

$$\eta(0,t) = \frac{T}{c}\left[t\cdot e^{-\frac{K}{2}t}\left(I_o(\tfrac{K}{2}t)+I_1(\tfrac{K}{2}t)\right)-t'e^{-\frac{K}{2}t'}\left(I_o(\tfrac{K}{2}t')+I_1(\tfrac{K}{2}t')\right)H(t')\right] \tag{5.10}$$

where $t' = t - t_1$

Using equation (5.10) and tables of Bessel Functions we may now evaluate the displacement at time $t = t_1$. Figure 21 shows how friction influences the solution.

For spectral comparisons it is also useful to have a solution in frequency space. Consider the same system as before described by equation (5.4) and the previously used boundary conditions, but with a periodic wind-stress:

$$T = Ae^{i\omega t} \qquad x \leq d$$

$$T = 0 \qquad x > d.$$

Separation of the x-dependence leads to the equation

$$X'' - \gamma^2 X = -i\omega Ac^{-2}$$

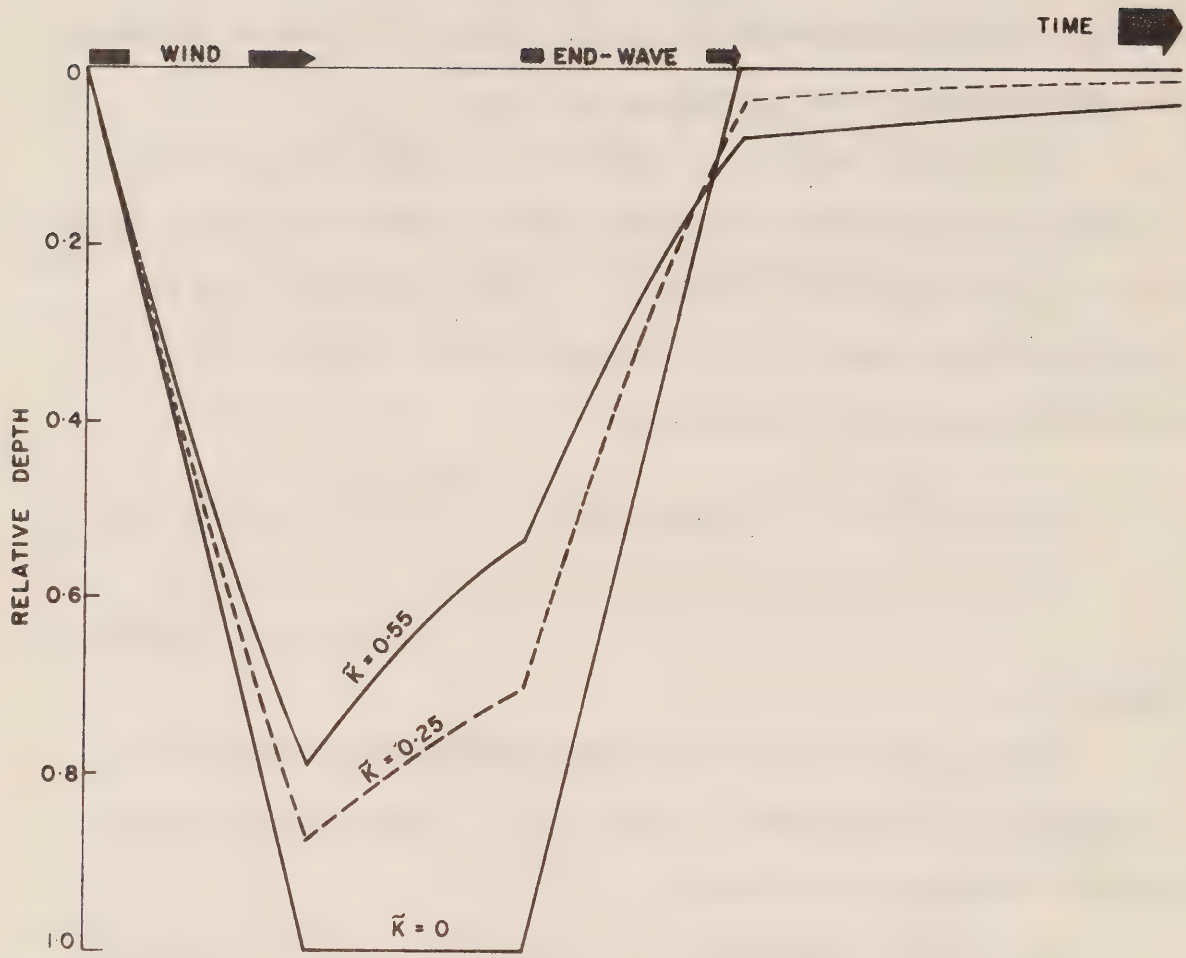


Figure 20. Response of model to uniform wind, showing effect of friction and end wave.

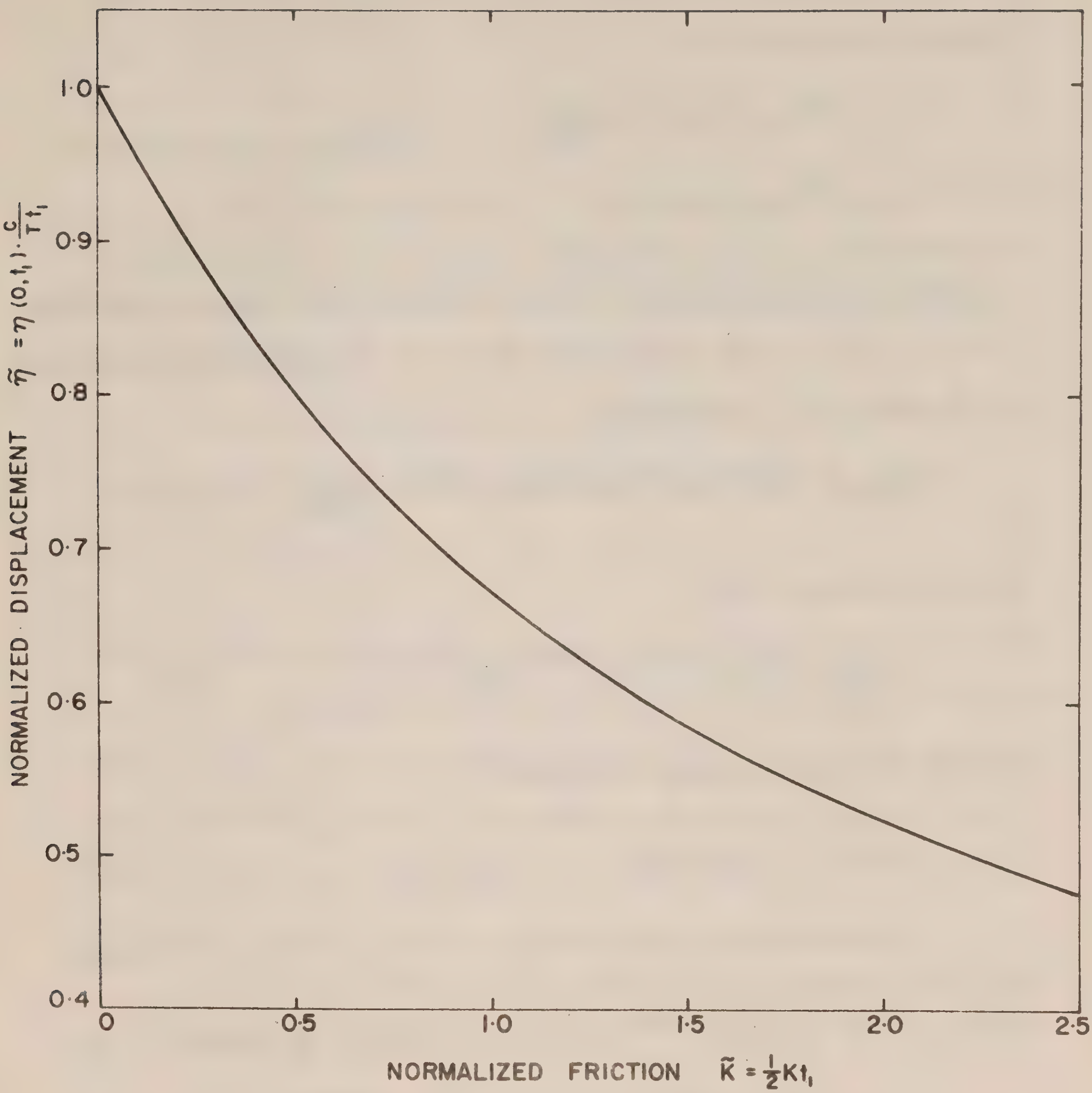


Figure 21. Normalised friction plotted against normalised displacement of the interface depth with respect to the surface following a step impulse wind of duration t_1. The quantity c is the internal mode phase speed; T is the kinematic wind-stress and K is the internal mode friction.

where $\gamma = \frac{1}{c}\sqrt{i\omega K-\omega^2}$. The general solutions for the inner and outer regions respectively, are

$$U = e^{i\omega t}\{C_1e^{\gamma x}+C_2e^{-\gamma x}+\frac{i\omega k}{c^2\gamma^2}\} \qquad x \leq d$$

$$U = e^{i\omega t}\{C_3e^{\gamma x}+C_4e^{-\gamma x}\} \qquad x > d\,.$$

Following the same procedure as before we apply the boundary conditions at $x = 0$ and $x = \infty$ and match U and $(\eta''-\eta')$ at d. Restricting attention to the region $x \leq d$ we obtain:

$$U(x,t) = e^{i\omega t}\left[(\tfrac{1}{2}e^{-\gamma d}-1)e^{-\gamma x}-\tfrac{1}{2}e^{-\gamma(d-x)}+1\right]\frac{i\omega A}{c^2\gamma^2} \qquad x \leq d\,.$$

Applying equation (5.5)

$$\eta(x,t) = \frac{Ae^{i\omega t}}{\gamma c^2}\left[e^{-\gamma x}-\tfrac{1}{2}e^{-\gamma(d+x)}-\tfrac{1}{2}e^{-\gamma(d-x)}\right] \qquad x \leq d$$

of which the real part can be written

$$\eta(x,t) = G\ \mathrm{Sin}(\omega t+\phi) \qquad x \leq d\,. \qquad (5.11)$$

In the solution (5.11) the gain $G = \frac{A}{cr^{\frac{1}{2}}}\sqrt{a^2+b^2}$ and the phase angle $\phi = \mathrm{Sin}^{-1}\left(\frac{-b}{\sqrt{a^2+b^2}}\right)$, where a and b are defined as follows:

$$a = \mathrm{Sin}\left(\theta-\frac{x}{c}r_1\right)e^{-\frac{x}{c}\cdot r_2}-\tfrac{1}{2}\mathrm{Sin}\left(\theta-\frac{(d+x)}{c}\cdot r_1\right)e^{-\frac{(d+x)}{c}\cdot r_2}$$

$$-\tfrac{1}{2}\mathrm{Sin}\left(\theta-\frac{(d-x)}{c}\cdot r_1\right)e^{-\frac{(d-x)}{c}\cdot r_2}$$

$$b = \mathrm{Cos}\left(\theta-\frac{x}{c}\cdot r_1\right)e^{-\frac{x}{c}\cdot r_2}-\tfrac{1}{2}\mathrm{Cos}\left(\theta-\frac{(d+x)}{c}\cdot r_1\right)e^{-\frac{(d+x)}{c}\cdot r_2}$$

$$-\tfrac{1}{2}\mathrm{Cos}\left(\theta-\frac{(d-x)}{c}\cdot r_1\right)e^{-\frac{(d-x)}{c}\cdot r_2}$$

and $\quad r_1 = (\omega^4+\omega^2K^2)^{\frac{1}{4}}\ \mathrm{Sin}\theta$

$$r_2 = (\omega^4+\omega^2K^2)^{\frac{1}{4}}\ \mathrm{Cos}\theta$$

$$\theta = \tfrac{1}{2}\mathrm{Tan}^{-1}\left(\frac{-K}{\omega}\right) .$$

Estimating the Parameters

Since wind measurements are in the form of hourly average values, it seems reasonable to superpose model solutions for a succession of step-like impulses such as (5.9), each one representing the hourly value of wind-stress.

Given an appropriate drag coefficient C_d we may estimate the kinematic wind-stress W from the measured wind-speed U, thus:

$$W = C_d\, U|U|\, \frac{\rho_a}{\rho_w}$$

where $\frac{\rho_a}{\rho_w}$ is the density ratio of air to water which I have taken as 1.2×10^{-3}. In evaluating wind-stress from the anemometer at Lone Tree Point I used a drag coefficient of 1.4×10^{-3}. In the case of data taken on the roof of the F.R.B. barge at Port Alberni a value of 1.3×10^{-3} was used, reflecting the slightly greater height of the measurement.

The speed of the undamped internal wave depends on the depths and densities of the two layers:

$$c = \sqrt{g\frac{\Delta\rho}{\rho''}\frac{h'h''}{h}} .$$

With little loss in accuracy we may set $\frac{h''}{h} \approx 1$: even over the sill the lower layer is more than 10 times the upper layer thickness. The term $h'\frac{\Delta\rho}{\rho''}$ must at best be only a rough approximation. We are using a two-layer representation for a continuous density distribution that varies

both vertically and horizontally. Typically $\frac{\Delta\rho}{\rho}$ varies from about 1% off Uchucklesit Inlet to slightly over 2% near the inlet head. Choice of an equilibrium thickness h' is also somewhat arbitrary. I have chosen a value c = 85 cm/sec which seems appropriate for the upper reaches of the inlet. This value corresponds to a density difference of 2% for an equilibrium thickness of 368 cm, or about 1.8% for a 4 meter thickness.

The distance d over which the wind usually acts is about 35 km. I have taken the quantity $\frac{d}{c}$ as 15 hours; this is rather longer than indicated by the value of c just chosen, but is intended to reflect the smaller density difference in the lower part of the inlet. As will be shown subsequently, for solutions near the head, the model is quite insensitive to changes in the value of d.

As noted in Chapter 2, the internal tide generated in the harbour appears to decay to about one half of its amplitude by the time it reaches Stamp Narrows. Despite the difficulty of determining the decay more precisely, this value does offer an opportunity for estimating the frictional coefficient. Using the exponential decay formula (5.6) and solving it for different values of K at the M_2 frequency we obtain the curve in Figure 22 applicable for Stamp Narrows ($\frac{x}{c}$ = 2 hours). A decay to one half corresponds to a coefficient of K = 0.8 Hrs^{-1}.

We can apply these values to equation (5.10) to see how the surface layer thickness responds to a 1 dyne/cm^2 wind-stress lasting for 1 hour. The maximum change of 35.4 cm occurs at the moment the wind ceases. It has decayed to 9 cm in 10 hours, 4 cm in 50 hours and is down to 2.7% of its maximum value after 200 hours. Asymptotic expansion

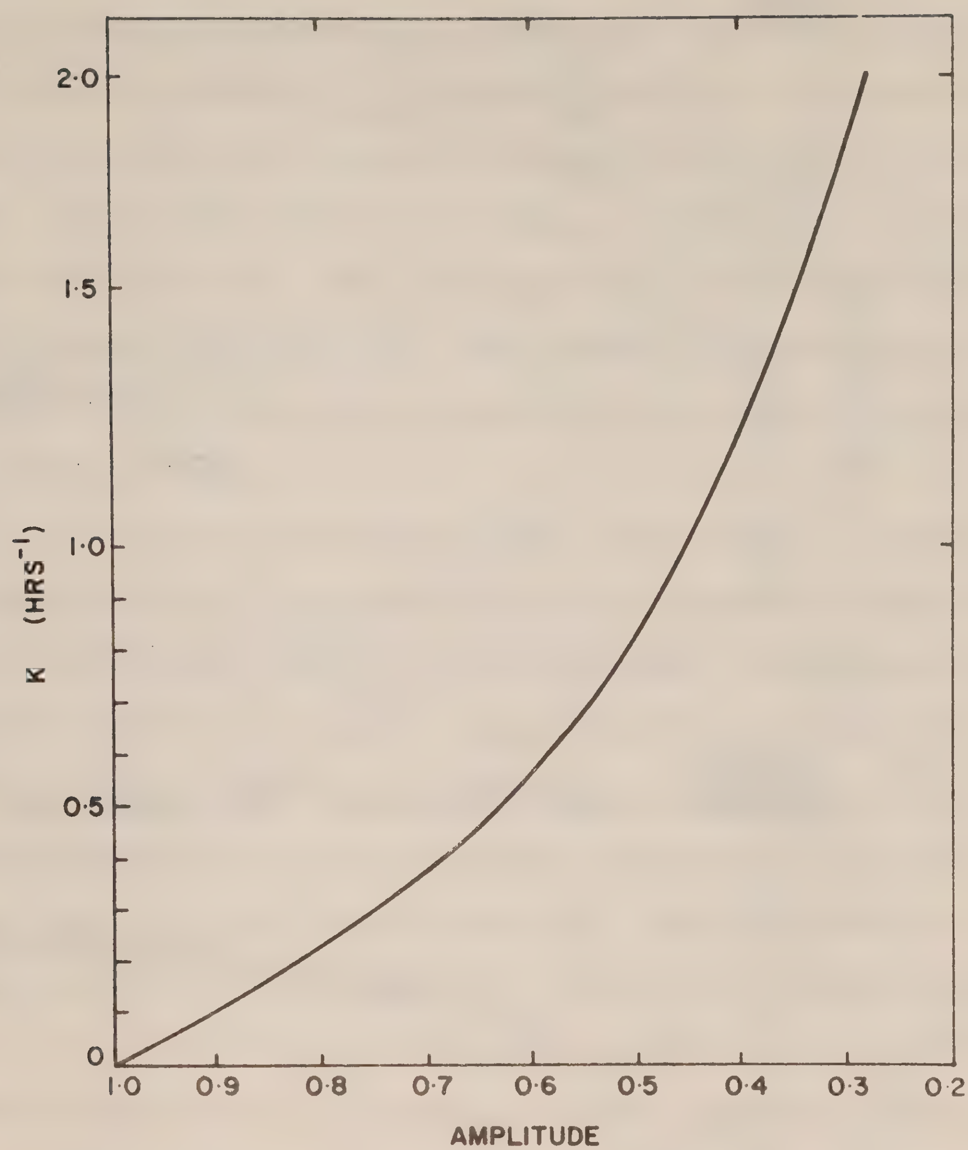
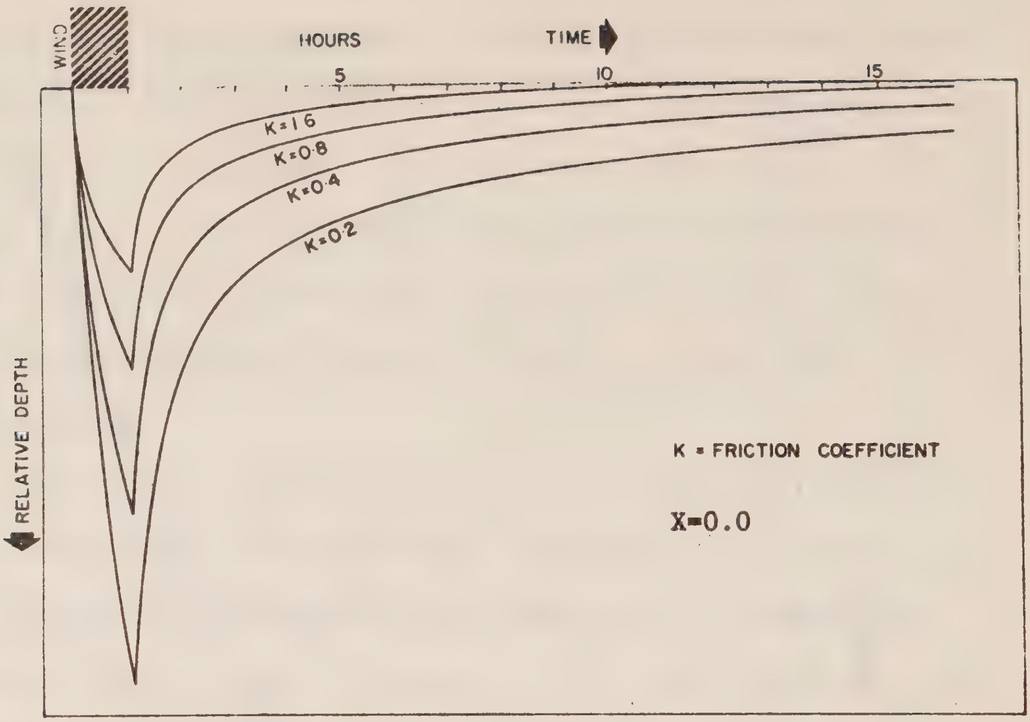
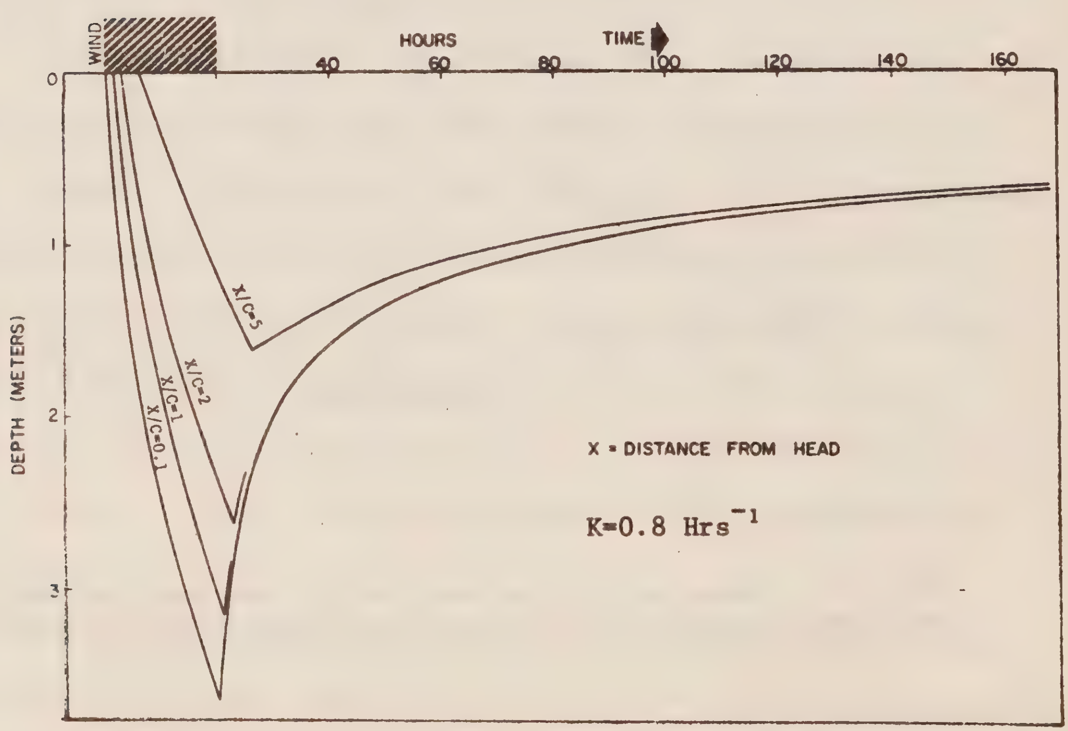


Figure 22. Decay of internal wave of M_2 frequency between Hohm Island and Stamp Narrows (X/C = 2 hours) as a function of friction.



23(a)



23(b)

Figure 23(a). Depth of interface with respect to surface for step-like wind impulse for different friction coefficients. K has units Hrs^{-1}.

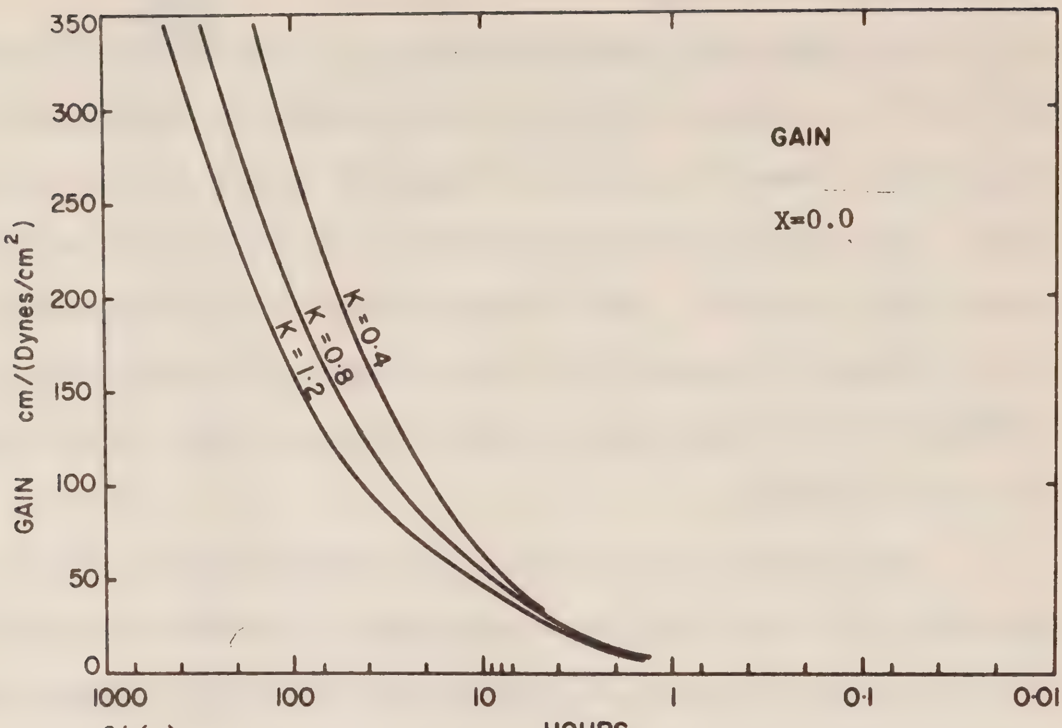
Figure 23(b). Depth of interface at different points down the inlet for step-like wind impulse. X is distance from inlet head, C is internal mode phase speed; X/C has units of hours.

of the solution (5.10) shows that for large t, the displacement is proportional to $t^{-\frac{1}{2}}$.

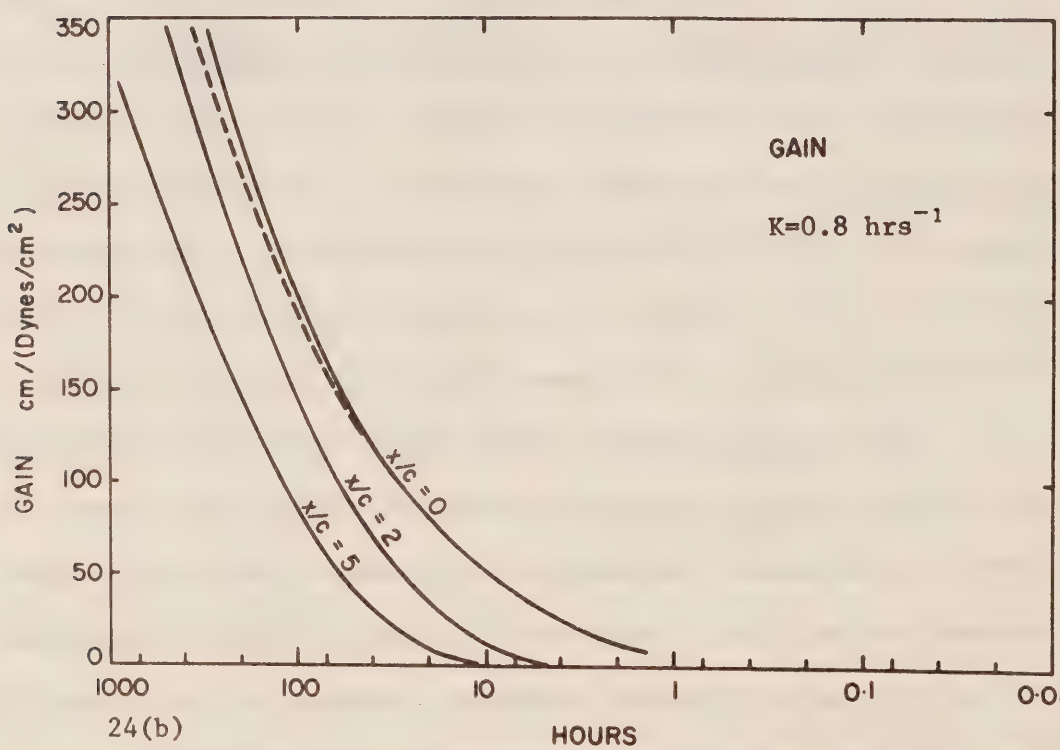
The effect of a finite distribution of wind-stress acting over the inlet is to slightly reduce the displacement for large values of t. Figure 23(a) shows the response for different values of K, at the inlet head. Figure 23(b) indicates the variation of the response at different points down the inlet. Over the range shown, as the distance from the head increases the shape of the curve changes and the amplitude decreases, but for large values of time the displacements at different locations converge.

Now consider the frequency space representation. Solving equation (5.11) for a periodic wind-stress at different frequencies, we can evaluate the Amplitude Transfer Function, T(f). Figures 24(a) and (b) show how this function varies for different K and x. The effect of changing the frictional coefficient is more pronounced at lower frequencies, but increasing the distance from the inlet head has a much greater effect on higher frequencies. The dashed curve in Figure 24(b) shows the solution for a wind-stress of infinite extent at x = 0. In the frequency range shown, the effect is to slightly decrease the gain; at still lower frequencies the gain increases.

The Transfer Function curves demonstrate an important feature of the model: surface layer thickness responds much more readily at lower than at higher frequencies. For example, using the values derived earlier, i.e. $K = 0.8 \text{ Hrs}^{-1}$, a periodic wind of amplitude 1 dyne/cm^2 at the diurnal frequency produces a response of amplitude 89 cm; for a 300 hour periodicity the response is 3.4 Meters.



24(a)



24(b)

Figure 24. Gain of the model for different friction coefficients and different distances from the inlet head (X/C is in Hours). The dashed curve in the lower figure shows the gain at the inlet head for the case of a wind-stress of infinite extent.

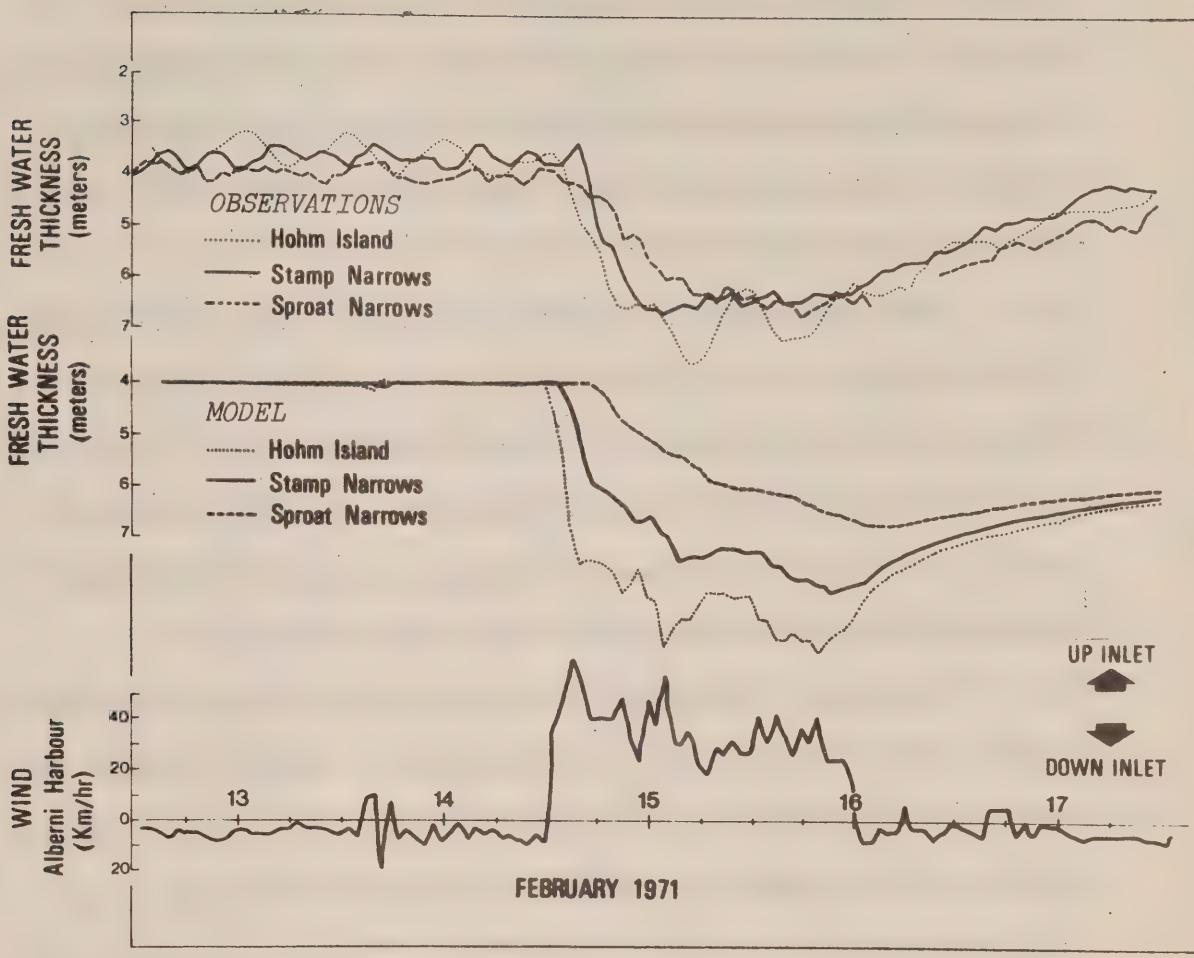


Figure 25. Comparison of model response and observations corresponding to data shown in Figure 10.

Comparing Theory with Observations

The occurrence of strong up-inlet winds following a long calm, which is represented by the observations shown in Figure 10, page 39, offers an opportunity for comparing the model with real data. In practice, the convolution integral (5.8) need only be evaluated once, a succession of solutions then being superposed, each one being weighted by the successive hourly wind-stress values. The solutions are plotted in Figure 25.

When comparing the theoretical solution with the observations it is important to keep in mind that the concept of Fresh Water Thickness is not identical to the model representation. In the case of the model the dynamics of the system are found for a two layer inlet; the observed Fresh Water Thickness is simply a convenient parameterisation of a continuous density distribution.

Now compare the model solutions in Figure 25 with the observations. Both show the same general features: a sudden increase and a slow return to equilibrium. However the model predicts too large a change and the return to equilibrium is too slow, especially at Sproat Narrows.

This section of data was chosen for comparison because the long calm which preceded the storm gives an opportunity to observe the response from essentially zero initial conditions. However the Lambrecht anemometers had not been installed at the time and it was necessary to use wind data collected from the "Velella". The anemometer at this location is not considered very accurate (R. Herlinveaux, personal communication) errors of 10 to 15% having been found on a previous calibration. Moreover the location of the instrument itself, on the

roof of the barge, makes it rather susceptible to acceleration effects. These conditions suggest that the drag coefficient chosen was too large and the stress overestimated. A smaller stress would have yielded results closer to the observations. On the other hand the shape of the Sproat Narrows prediction suggests that the friction coefficient chosen was a little too large; a smaller friction coefficient would have produced a more rapid return to equilibrium.

Longer comparisons with the model predictions for Stamp and Sproat Narrows using data from the Lambrecht anemometers gave quite good results. The Hohm Island predictions were best of all as might be expected, for it is the least sensitive to errors in the friction coefficient. For prediction purposes it would seem useful to carefully vary the parameters C_d and K in order to obtain the best possible fit to observations.

Using data for Hohm Island shown in Figure 8, with the solution (5.8) and wind measurements from Lone Tree Point, we can again compare the model response. Figure 26 shows the solution together with the observations. Unlike the previous case the observations do not indicate zero initial conditions and there is an early period of two to three days before the solution corresponds to observed conditions. Thereafter it follows the data rather well and, except for the high frequencies, reproduces almost all the more important features of the response.

We may make frequency space comparisons by deriving an observed Transfer Function from the spectra and coherence plots for Hohm Island; these are shown in Figures 17 and 18. Figure 27 shows the model and observed Gain and Phase Functions together. Apart from some significant

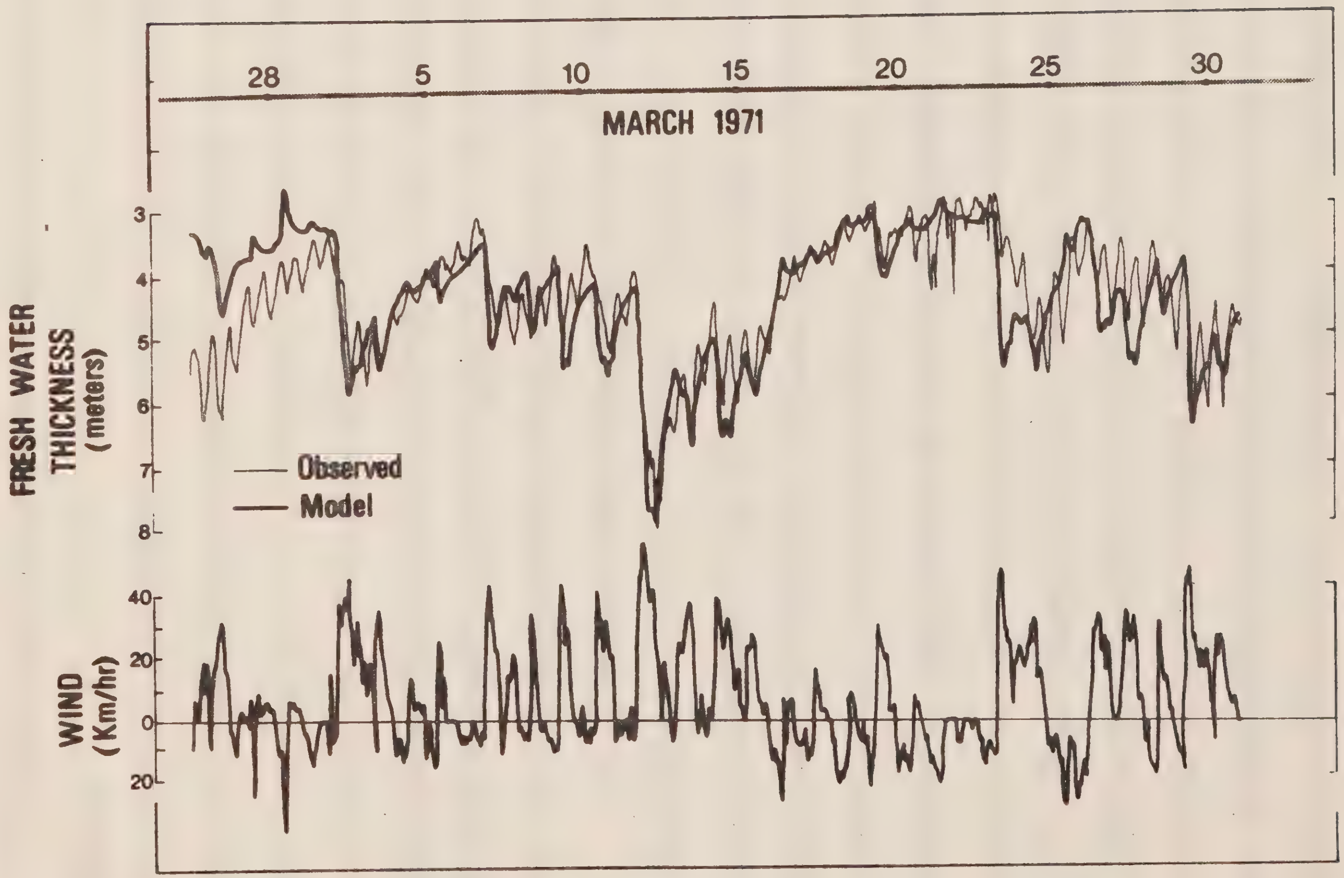


Figure 26. Comparison of model and data for Fresh Water Thickness at Hohm Island and measured wind-speed at Lone Tree Point. Since the model starts with zero initial conditions it takes a few days to catch up with the data.

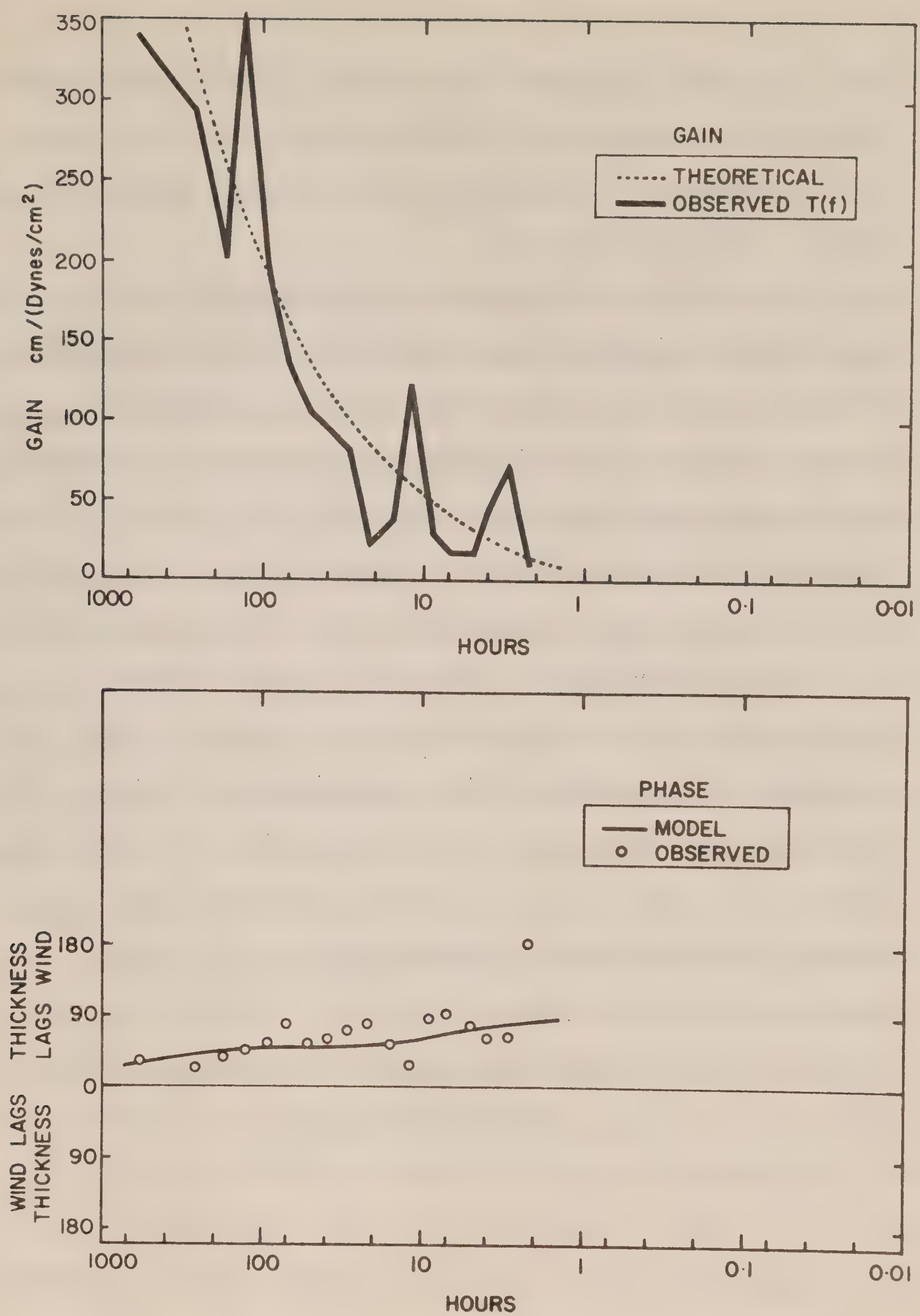


Figure 27. Comparison of Gain and Phase for model and 33 days of Fresh Water Thickness data at Hohm Island shown in Figure 8.

peaks in the data, the model reproduces the general trend shown by the observations. Progressively better coupling occurs as we move to lower frequencies. In addition the observed phase angles fall fairly close to the theoretical curve.

The peak in the observed Amplitude Transfer Function at the semi-diurnal frequency is almost certainly a spurious estimate due to the large internal M_2 tide. At the diurnal frequency the observations indicate a rather poorer coupling than the model predicts. Fluctuations above and below the theoretical curve also occur at 129 and 173 hours. These points have only 4 degrees of freedom, however, and departures of this magnitude from a smooth curve cannot be considered significant.

It is of interest to consider the possible existence of internal seiches in the inlet. It is not clear what boundary condition is appropriate at the mouth since the stratification becomes progressively less intense near this area due to the entrainment. If the boundary condition were similar to that used for calculating surface mode seiches, then the oscillation would represent a standing wave of four times the length of the channel. Equation (5.5) shows that for the parameters chosen a maximum wavelength is 48 kilometers; under such conditions an internal seiche could not exist.

Chapter 6

SUMMARY

This study represents a concentrated effort to throw light on the main features of a stratified inlet's response to wind.

The project has included development of simple and relatively inexpensive instrumentation for monitoring the structure of surface waters in Alberni Inlet over a period of many weeks. Together with wind measurements the observations have shown how the thickness of the surface layer responds to a changing wind-stress.

Strong up-inlet winds produce a rapid thickening at the inlet head. This distortion appears to propagate back down the inlet suffering an attenuation as it travels. The return to equilibrium can take several days; the inlet's response is similar to that of a heavily damped mechanical system.

Using a simple parameterisation of the data it is possible to see how wind affects the intensity of the stratification. As might be expected, mixing increases with strong winds, but the effect is more noticeable away from the inlet head.

Current measurements taken by the Canadian Hydrographic Service at Sproat Narrows have shown that the movement of water at a depth of 2 meters is closely coupled to the wind. At 15 and 40 meters the current is mainly tidal, but with an unexplained down-inlet bias at 40 meters.

Time series analysis has put these observations into sharper

relief. Three months of wind and current data have shown that there is about eighty times more energy of diurnal frequency at 2 meters than can be attributed to tides alone. On the basis of simple time scale considerations I have used phase angles between wind and current to estimate a bulk eddy viscosity for the upper two or three meters of the inlet. This method has yielded values between 1 and 10 cm^2/sec.

On the other hand spectral analysis of surface layer thickness data from Hohm Island shows most of the internal fluctuations to be of much lower frequency. I have used a simple two-layer frictional model of an inlet to explain these results. Neglecting the normal processes of estuarine circulation the model accounts for the heavy damping evident in the observations by means of linear friction. Despite its simplicity the model succeeds in describing the coupling between wind and surface layer thickness and provides a means of predicting the internal response on the basis of measured wind-stress.

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